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NOTES ON SOME SPECIES AND SUBSPECIES OF THE GENUS LEPORINUS SPIX.

BY

N. A. BORODIN.

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WITH ONE TEXT-FIGURE AND SEVENTEEN PLATES.

CAMBRIDGE, U. S. A.
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INTRODUCTORY REMARKS

The Thayer Expedition under the leadership of Professor Louis Agassiz (1865), secured such a rich collection of Brazilian fresh-water fishes that it served as the principal material for several capital ichthyological works on the *Characinidae* and *Siluridae* by Baron Dr. Franz Steindachner of Vienna, and by Dr. C. H. Eigenmann of Bloomington, Indiana. Four volumes by the latter on *Characidae* have already been published by the Museum of Comparative Zoölogy, and the fifth volume is now nearly prepared for publication.

Steindachner began to study the collections at the Museum of Comparative Zoölogy in 1870, being engaged for that work by Professor L. Agassiz. He worked there until the end of 1871, when he took part, with Agassiz, in another expedition around South America on the steamship *Hassler*. He could not complete the study of these vast collections during his stay at Cambridge, and did not do so until later at the Vienna Museum, which had received a rich assortment of duplicates. (See introduction to Steindachner's work "Die Süsswasserfische des Südöstlichen Brazilien," Sitzb. Akad. Wissensch. Wien. 1874, 69, Abth. 1, s. 508.)

But in order to pick out duplicates, it was necessary to know the identity of the species, which was not the case at that time with regard to many groups of South American fishes. Thus the stock in the M. C. Z. for years contained many unidentified fishes from that collection. There are authoritative testimonies of two eminent ichthyologists, Steindachner and Eigenmann, concerning the richness and importance of the Thayer Collection of South American fishes. Steindachner considered it "without any exaggeration the richest and the most complete in the world."

Eigenmann wrote in 1917: "The collection of fresh-water fishes made by Louis Agassiz and his assistants is the largest ever brought together by a single expedition. Forty years after it was gathered, it was still the most important collection of South American fresh-water fishes and contained a large number of undescribed species and genera." (Pp. 4, 3 of the introduction of the five-volume

work of Dr. C. H. Eigenmann on the American *Characidae*, Mem. M. C. Z., 43, 1, 1917; 2, 1918; 3, 1921; 4, 1927; and 5 shortly to appear.)

Fifty-two new genera and three hundred and twelve species belonging mostly to the subfamily *Tetragonopterinae* were established and described by Eigenmann. Upon completion of Steindachner's work, the subfamily *Anostominae* of the *Characinidae* family was still not completely studied. It seems that this group attracted the special attention of Professor L. Agassiz who ordered the drawings of seventeen fishes of the genus *Leporinus* Spix, to be prepared in advance, but they were not published because of Agassiz's death in 1873. These drawings, together with fragmentary rough drafts on different species of the genus *Leporinus* by the late Mr. S. Garman were found in the museum after his death in 1927.

Dr. Thomas Barbour invited the writer to study the collection of the genus *Leporinus* of the M. C. Z. in connection with Garman's notes and the above-mentioned drawings. The present paper is the result of this study. It contains a description of five new species, of which one is named for the late Mr. Garman, and three new subspecies.

New Species:	*Leporinus thayeri*
	" *garmani*
	" *crassilabris*
	" *cylindriformis*
	" *jamesi* Garman
New Subspecies:	*Leporinus fasciatus altipinnis*
	" " *tigrinus*
	" *crassilabris breviceps*

One of the new species, *Leporinus jamesi* Garman, is credited completely to Mr. Garman, because the specimen, which served for the drawing and the fairly good description, has not yet been found in the museum's collections. It is probably only misplaced in the shelves for Dr. Barbour remembers having seen it recently. Mr. Garman's notes on the several forms, although merely rough drafts, sometimes hardly legible and in no way completed for publication, gave, however, a guiding thread for finding the specimens on which the drawings and notes were based. These have been accurately determined.

All these and allied specimens have been studied and measured, and on the basis of these newly made measurements, the descriptions of the new species and subspecies has been made. The bibliographical references, which were carefully

compiled by Mr. Garman, have been of great value to the author. Unless otherwise indicated, all localities mentioned are in Brazil.

Gratitude is herewith expressed to Dr. Thomas Barbour, Director of the M. C. Z., for having found these notes and for having intrusted this interesting task to the writer.

Key to the species of Leporinus described in this paper

a. Body compressed, depth from 3 to 5 in body's length; anal with 10–11 rays; gill membranes broadly attached to the isthmus.
  b. Mouth inferior or subinferior, obviously pointing downwards.
    c. Snout short, obtuse ..... 1. *L. mormyrops* Steind., p. 271, pl. 1.
    cc. Snout long ..... 2. *L. garmani* n. sp., p. 272, pl. 3.
  bb. Mouth low, not pointing downwards.
    d. Snout obtuse, lips moderate, teeth $\frac{8}{8}$ ..... 3. *L. thayeri* n. sp., p. 273, pl. 2.
    dd. Snout oblong, lips large fatty, teeth $\frac{6}{6}$ ..... 4. *L. crassilabris* n. sp., p. 274, pl. 4.
  bbb. Mouth terminal.
    e. Body covered with black markings of different shapes.
      f. 3–4 round spots on the anterior portion of the lateral line; lower teeth long, curved much produced ..... *L. friderici* (Bloch), p. 275, pl. 15.
      ff. 2–4 round spots along the lateral line and several bars on the back; teeth truncate on both jaws ..... *L. nattereri* Steind., p. 277, pl. 11.
      fff. 10 black cross bands encircling the body; scales very small (41–44 in lat. line) *L. fasciatus* C. V., p. 277, pl. 6.
      ffff. Three black blotches on the anterior portion and a continuous longitudinal stripe along the posterior portion of the lateral line ending on the caudal; scales large. *L. mulleri* Steind., p. 281, pl. 12.
      fffff. Back, dorsal, anal and pectoral fins with dusky bars; scales small. *L. jamesi* Garman, n. sp., p. 281, pl. 9.
    ee. Body in adults usually without black markings; teeth on both jaws truncate.
      g. Snout obtuse, head broad, lower teeth produced .... *L. pachyurus* Gnthr., p. 282, pl. 14.
      gg. Snout conical, lower teeth not produced.
        h. Body deep, $3\frac{2}{5}$; teeth $\frac{6}{6}$ ..... *L. conirostris* Steind., p. 284, pl. 5.
        hh. Body less deep, 5; teeth $\frac{5}{5}$ ..... *L. margaritaceus* Gnthr., p. 286, pl. 13.
aa. Body very deep, depth $2\frac{1}{2}$; anal with 13–14 rays; gill membranes narrowly attached to the isthmus. *L. hypselonotus* Gnthr., p. 287, pl. 17. (Syn. *Abramites hypselonotus* Fowler).
aaa. Body not compressed, slightly rounded, thick.
  i. Depth $4\frac{3}{4}$; scales small ..... *L. cylindriformis* n. sp., p. 288, pl. 10.
  ii. Depth about 3, scales large ..... *L. bahiensis* Steind., p. 289, pl. 16.

Remark: — The length of the body is always taken from the tip of the snout to the base of the caudal fin.

1. Leporinus mormyrops Steindachner

Steindachner Fr. 1875, Sitz. Ber. Wien. Akad., **71**, p. 240, pl. 6.

M. C. Z. No. 20,366, six specimens, size from 99 to 140 mm., from Parahyba River. One of these specimens is drawn on Plate 1.

D. 12, A. 10 (11); V. 9; L. l. 36–37; transv. 1. $4\frac{1}{2}$–$3\frac{1}{2}$; teeth $\frac{8}{8}$.

Body elongate compressed, upper outline moderately curved from snout to

dorsal. Depth 4; head convex above and concave below, $4\frac{1}{2}$ in body; eye 5, snout $2\frac{1}{3}$, produced and curved. Mouth inferior, opening downward. Teeth short, narrow, dark-edged, eight in each jaw.

Fins shortish, anal not reaching halfway to caudal, pectoral hardly reaching halfway to ventral.

Scales rather large and broad. Brighter central portions of scales and darker edges thereof form vittae. Young have faint transverse bands of brownish; these disappear with the adults.

This is a well-defined form, and can be very easily distinguished from many other species. I except, however, the three allied species described below, which agree in having a peculiar form of head and inferior mouth opening downwards. *L. mormyrops* can be considered as the type for a subgenus with the name *Hypomasticus*, which indicates the said peculiarity of the form and of the position of the mouth, common to the species *L. mormyrops* and *L. garmani*, and not observed with numerous other species of *Leporinus*.

L. mormyrops is represented in the M. C. Z. collection, besides No. 20,366, by the following specimens:

20,425, one specimen, about 150 mm. long, from Santa Clara,

20,764, one specimen about 140 mm. long, from Parahyba River.

These three collected by the Thayer Expedition, 1864. No. 20,369, one specimen about 118 mm. long, from Parahyba River, collected by the Hassler Expedition, 1872.

It is a rather small-sized fish. A female specimen 135 mm. long already contained well-developed eggs. Steindachner's types were at the utmost 200 mm. long. Our description of this species in the collection of the M. C. Z. differs only slightly from that of Steindachner, in that the number of scales in the lateral line in our specimens are 36–37, whereas he states them to be 38–41.

2. Leporinus garmani sp. nov.

Specific characters: — Snout very long, $2\frac{3}{4}$ in head and of peculiar form (see pl. 3, fig. 5); mouth subinferior; teeth, six broad-edged on the upper, and six pointed on the lower jaw; scales rather large.

D. 12; A. 10; V. 9; P. 18; L. l. 34; transv. line $\frac{5}{4}$; teeth $\frac{6}{8}$.

Description of the type specimen M. C. Z., No. 20,420, 108 mm. long, collected by Hartt and Copeland of the Thayer Expedition, 1865, at Arassuachy, Brazil (Plate 3).

Body elongate, slender and compressed, depth $4\frac{3}{4}$ in length, head narrow, pointed $4\frac{1}{4}$ in body. Snout long, $2\frac{3}{4}$ in head, blunt and very peculiar in form. Eye large, 4 in head, 2 in snout. Mouth small, subinferior. Teeth shortish, 6 on the upper jaw and 8 on the lower. Those on the upper jaw all broad-edged, the two middle ones with a semilunar notch. Those of lower pointed, the two middle ones much larger and slightly curved (see fig. 4, pl. 3). All the teeth are tipped with dark yellow excepting hindmost of lower jaw, which are small and white. Fins comparatively short with the exception of caudal, which is deeply forked and its lobes are very long, longer than head.

Scales large, with marked striae along the middle. Coloration silvery to yellowish, no black markings except diffused group of brown punctulations in the middle of the base of caudal.

In the form of the snout, it resembles *L. mormyrops*, Steind., from which it can be easily distinguished by the position of the mouth, the dentition and squamation.

3. Leporinus thayeri sp. nov.

Specific characters: — Snout blunt, rounded, mouth low but not subinferior; eight dark amber teeth on each jaw; lips fringed; paired fins and anal shortish; dorsal high; caudal deeply forked, upper lobe somewhat longer, as long as body's depth; adipose tipped with dark brown, no markings on the body.

D. 12; A. 10; V. 9; P. 17; L. 1. 37; transv. 1.–$\frac{4}{3}$; teeth $\frac{8}{8}$.

Description of the type specimen M. C. Z., No. 20,364, 134 mm. long, collected by the Thayer Expedition in Parahyba River (Plate 2).

Body elongate, compressed, depth almost equal to head's length, 4 in body. Head subconical, compressed, crown high in transverse arch nearly straight longitudinally, $4\frac{1}{2}$ in body; eyes of moderate size, $4\frac{1}{2}$ in head, situated in mid-length of head. Snout blunt, rounded, $2\frac{1}{2}$ in head; mouth small, situated low, but not subinferior as with *L. garmani*.

Teeth, eight in number on each jaw, upper incisors truncated, without any notches, lower slightly pointed. All of dark-amber color; lips fringed. Scales large, 4 rows above and 3 below lateral line, 37 along lateral line.

Fins rather small with the exception of dorsal which is high, $1\frac{1}{4}$ in body's depth; and caudal, which is deeply forked with sharp ended lobes, the upper, longer lobe being as long as body's depth. Adipose fin tipped in dark amber (brown), which is omitted in the drawing of Plate 2. No other dark markings on the body.

This species can be easily distinguished from its relatives, from *L. conirostris*

by having an obtuse snout, from *L. nasutus* by the shorter snout and higher position of mouth; from many others by the absence of any markings on the body and by the dark-tipped adipose.

There are several more specimens of this species in the collection of the M. C. Z., namely: one paratype, No. 20,364a (in the same bottle) from Parahyba River; No. 20,367, five specimens, 140–160 mm. long, from Parahyba River, collected by the Hassler Expedition; No. 20,414, one specimen, 159 mm. long, from Rio Muriahy, a tributary of the Rio Parahyba, collected by Hartt and Copeland of the Thayer Expedition.

4. Leporinus crassilabris sp. nov.

Specific characters: — Large, thick, papillose fleshy lips; long head, $3\frac{1}{4}$ in body, depressed on the top, humpbacked; pectorals long, reaching base of ventrals.

D. 12; A. 10; V. 9; P. 17; L. l. 37; transv. series $4\frac{1}{2}$–$3\frac{1}{2}$; teeth $\frac{6}{6}$.

Description of type specimen M. C. Z. No. 20,423, 90 mm. long, collected by Hartt and Copeland of the Thayer Expedition, in Rio Jaquitinhonha, Brazil (Plate 4).

Body slightly elevated, depth $3\frac{1}{4}$ in body. Head long, greater than depth of body, $3\frac{1}{2}$ in body. Crown longitudinally concave. Eye 4 in head. Snout long, $2\frac{1}{2}$ in head. Mouth-level low. Lips large, very thick, soft and fleshy, the upper protruding far over lower one. Teeth short, six on each jaw, the upper all broad; two larger ones in front supplied with short oblique points near inner edge and a feeble notch near the outer. Two frontal lower also broad and supplied with oblique points rounded on the apex. They are bright yellow. Fins comparatively long, pectorals reaching the base of ventral.

Scales large, in four entire rows above and three below lateral line. They have longitudinal striae near their middle and their hind two thirds are covered with silver.

The type specimen, which is undoubtedly a young one, has nine dusky cross bands which are faint and not complete, some of them forming vague dusky blotches. These bands and blotches are absent in larger specimens 345–420 mm. long, which, moreover, show other differences. Their lips are much more fleshy and more protruding; in a specimen 380 mm. long, the upper lip is 20 mm. longer than the lower one; this results in altering the whole form of the head which looks like a short trunk (see fig. in the text). Their teeth are nearly truncate (not pointed), probably from much wear. For comparison, a large specimen, 380 mm. long, M. C. Z. No. 20,422, paratype, has the following measurements: head $3\frac{1}{6}$,

depth 4, snout $2\frac{1}{3}$, eye 8. Another specimen, 295 mm. long, No. 20,422a, repeats all characters of the larger specimen. This species is known only from the river Jaquitinhonha, eastern Brazil, running direct to the Atlantic Ocean. The adult

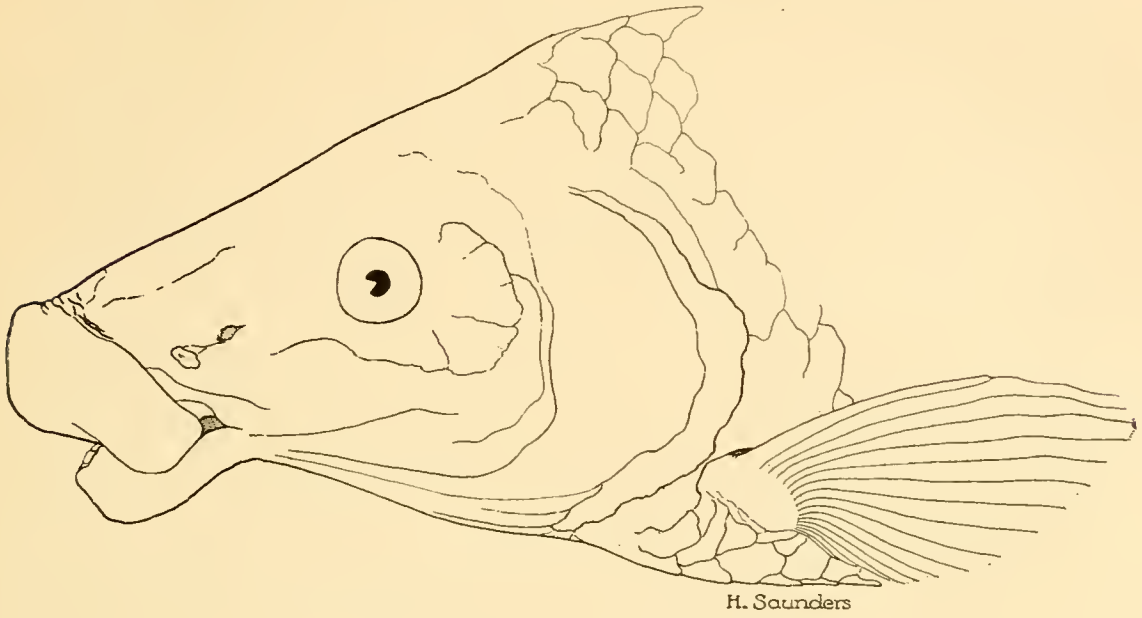


FIG. 1.— Leporinus crassilabris Borodin.
No. 20,422. × $\frac{3}{4}$.

can be readily distinguished from all other species by its large thick lips and peculiar form of the head, characters which are not so striking on the young specimen shown in Plate 4.

4a. LEPORINUS CRASSILABRIS BREVICEPS, subsp. nov.

One large specimen of *L. crassilabris*, M. C. Z. No. 20,419, 360 mm. long, from Rio Arassuahy, has large, fleshy lips, the most important character of the type and paratype of this species, but differs considerably from them by having a short head which is contained 4 times (not $3\frac{1}{2}$) in body's length. Depth $3\frac{1}{2}$; eye 8; snout $2\frac{1}{4}$; L. l. 35–36; transv. l. $4\frac{1}{2}$. Teeth $\frac{6}{6}$, short, truncate, of dark amber color. Lips large, papillose. Scales very large and broad. Their margin well covered with silver.

A perfectly preserved specimen collected in 1865 by the Thayer Expedition.

5. LEPORINUS FRIDERICI Bloch

Salmo friderici BLOCH, 1793, Naturgesch. Ausländ. Fische Atl., fig. 378.
Curinatus acutidens VALENCIENNES in D'Orbigny's Voyage dans l'Amer. merid., Poissons, pl. 8, fig. 1.
Leporinus frederici CUVIER & VALENCIENNES, **22**, p. 2.

D. 12 (13); A. 10 (11); V. 9–10; L. l. 37–39; transv. l. $\frac{5}{4}$; teeth $\frac{8}{6-8}$ (Plate 15).

Body moderately compressed, deep and arched in front of the dorsal, depth $3\frac{1}{4}$. Head short, pointed at snout, about 4 in body. Eye small, $4\frac{1}{2}$ in head, situated nearer to the snout than to the opercle. Mouth small, anterior cleft very short, lips moderate, papillose. Teeth, eight on the upper jaw, truncate on edge; those on the lower jaw are in most cases also eight in number, but sometimes only six; they are long, narrow, curved, sharply pointed and much produced. In the adults, however, they are short, partly truncate probably as the result of wearing. It might be worth while to mention that the teeth of Leporinus in general, recall the incisors of mouse-like rodents, which is probably in close connection with the fact that these fish are plant-eaters, and their teeth are liable to be worn on the surface from use.

Dorsal moderate, its upper margin convex; pectoral and ventral small; anal a little larger, its hind margin convex; caudal deeply notched, lobes rounded. Pectoral reaches only half way to ventral; ventral, when stretched out, reaches caudal rays. Three, sometimes four, large dark brown spots, roundish or oval, on the lateral line.

A considerable difference exists between adult and young specimens of this species; in the young the dark spots are more developed and there are about 14 faint cross-bars on the back which do not descend on the sides below the lateral line; their teeth on the lower jaw are sharper and more produced, their caudal lobes are somewhat pointed, not rounded. On the other hand, many variations can be observed in coloration and exterior forms in specimens collected in different rivers.

The drawing (Plate 15) is made probably from a large alcoholic specimen, with no trace of the spots which are so characteristic of this species, as shown in the figures accompanying the original description by Bloch, as well as in Voyage D'Orbigny (see the reference above). It might also show more clearly another diagnostic character of this species, the steep ascending of the upper outline from head to dorsal fin and a deep body (depth $3\frac{1}{4}$ in body and not $3\frac{1}{2}$ as it is according to figure 1 on Plate 15).

This species, evidently, is a common fish in Brazilian waters. It is represented in the M. C. Z. collections by very many specimens from the following localities: Gurupa, Lake Hyanuary, Javary, Tabatinga, Bahia, Goyaz, Içá, Jutahy, Lake Aleto, Lago do Maximo, Obidos, Para, Porto do Moz, San Gonçallo, Santarem, Teffé, Montalegre, the Essequibo River, Surinam, and others. The largest specimens of the collection do not exceed 250 mm. Specimens in the Vienna Museum listed by Dr. Steindachner (l. c. Sitz., 1875, pp. 247–248) reached a maximum of 14 inches (350 mm.).

6. L. NATTERERI Steind.

L. nattereri STEINDACHNER Fr., 1876, Sitz. Ber. Wien. Akad., **74**, p. 114, pl. 12, fig. 1.

D. 12; A. 10 (11); V. 9, P. 17; L. l. 37–39; transv. 1. $\frac{5-6}{5-4}$; teeth $\frac{8}{8}$ (Plate 11).

Body elongate, much compressed; depth $3\frac{1}{3}$; peduncle high; head $3\frac{2}{3}$; eye large, $3\frac{1}{2}$ in head; snout deep; forehead profile concave, arched from nape to dorsal. Mouth small, anterior; lower jaw little longer. Teeth $\frac{8}{8}$ thin, feeble, chisel-shaped, truncate; those behind the incisors notched or serrated. Scales large, thin, set close, smooth, striae minute, hind edges membranous. Their central portion light, giving the appearance of vittae. Some specimens have four, some three spots on the lateral line. The silvery band along the lateral line, described by Steindachner and shown on his drawing, is faded on our specimens.

Though resembling *L. friderici* in color, this species is readily distinguished by the dentition and by the more compressed body. It is represented in the collection of the M. C. Z. by No. 20,384, 3 specimens, 108 mm., 83 mm. and 82 mm. long, from Teffé, and No. 19,825, 1 specimen, 94 mm. long from Santarem.

Steindachner's type specimens were 90–127 mm. long.

7. LEPORINUS FASCIATUS (Bloch)

Salmo fasciatus BLOCH, 1794, Naturgesch. Ausländ. Fische, **8**, p. 96, 379.
Leporinus novem fasciatus AGASSIZ & SPIX, 1829, Select. Gen. et Spec. pisc., p. 65, pl. 37.
Leporinus fasciatus MÜLLER & TROSCHELL, 1845, Horae Ichthyologicae, **1**, p. 11.
Leporinus fasciatus CUVIER & VALENCIENNES, 1849, Hist. Nat. Poissons, **22**, p. 34.

D. 12; A. 10; V. 10; L. l. 41–44; transv. $\frac{5-8}{5-7}$; teeth $\frac{8}{8}$ (Plate 6).

Body elongate, compressed; upper and lower outlines not greatly differing in curvature; head pointed, its length equal or somewhat shorter than the depth of body, contained about 4 times in body. Eye $3\frac{1}{2}$ in head. Its position near the middle of the head. Snout short, $2\frac{3}{5}$–3 in head. Jaws nearly equal, the lower appears longer in the open mouth because of longer teeth. Mouth small, anterior. Teeth eight on each jaw; upper short, pointed; lower longer, pointed, curved and produced. Scales rather small, thin, set close and firmly, varying in number of rows from 41–44 rows in lateral line, from 5 to 8 above, and from 5 to 7 below the lateral line, in transverse series between dorsal and ventral.

Fins of medium size. Dorsal shorter than head's length, caudal deeply forked its upper lobe contained $3\frac{1}{2}$–4 in the body's length.

There are from 8 to 11 transverse bands of brown to black between the head and the caudal, extending below the lateral line; a black bar across the inter-

orbital space, another across the snout. These markings are subject, however, to considerable variation in the number of bands, their width as compared with the interspaces, and in depth and color in the different subspecies.

Some of these subspecies have already been described as species, as for example, *L. affinis* Günther, represented in the M. C. Z. by many specimens, which, when compared with *L. fasciatus* (Bloch) and other new subspecies, do not show clear specific characters. We give below full details of all the subspecies of *L. fasciatus* together with comparative analysis thereof and the species itself.

The specific characters of *L. fasciatus* (Bloch) as they are summarized in Günther's Catalogue of fishes of British Museum (5, p. 308) based on specimens from the Essequibo River, Surinam and Brazil, are as follows: —

D. 12; A. 11; V. 11; L. l. 42; transv. 1. $\frac{7}{7}$. Depth $3\frac{2}{3}$; head 4; the eye is somewhat nearer to the end of the operculum than to the extremity of the snout. Lips fringed. Eleven blackish cross-bands: the first one across the interorbital space; the second on the nape of the neck, the third and fourth in front of the dorsal, the sixth, seventh and eighth between dorsal and adipose fins, the ninth and tenth behind the adipose fin, the eleventh on the base of the caudal fin.

Measurements of the specimen of *L. fasciatus*, M. C. Z. No. 20,443,[1] from Obidos, from which the drawing, Plate 6, was made, are given below: head 4; depth 4; eye $3\frac{3}{4}$; snout $2\frac{2}{3}$; lat. l. 44, transv. $5\frac{1}{2}$; teeth $\frac{8}{8}$; lower long, sharp pointed and curved. Eleven cross-bands on the body and head; behind the upper lip a conspicuous dark semi-circle not marked on the drawing. Dorsal as high as the body is deep at the vertical of its last fin, but shorter than the head's length. Another specimen of *L. fasciatus* (Bloch), M. C. Z. No. 20,434 from Lago do Maximo, Brazil, measures 150 mm. long; head $4\frac{1}{6}$; depth 4; eye 4; snout $2\frac{2}{3}$; L. l. 44; transv. l. $\frac{6}{6}$; teeth $\frac{8}{8}$; the hindmost very small, appearing as if just developed, 2 lower in front very long, projecting, curved, of dark amber color. There are 11 dark cross-bands as described by Günther.

Specimens which can be considered as typical *L. fasciatus* (Bloch) are represented in the collection of the M. C. Z. from the following localities: Bartica, Essequibo River, British Guiana and Gurupa, Iça, Jutuhy, Lago Alexo, Lago do Maximo, Para, Porto do Moz, Tapajos, Villa Bella.

The largest specimen in the collection do not exceed 300 mm. Most of them are about 150–170 mm.

The following three varieties or subspecies of *L. fasciatus* (Bloch) can be defined on the basis of the M. C. Z. collection:

[1] There are eight specimens in a bottle, size from 83–60 mm. The largest was taken for measuring.

7a. Leporinus fasciatus affinis Günther

Plate 7

In Günther's Catalogue this fish is rated as a separate species, characterized as follows: "Closely allied to *L. fasciatus* but with fewer bands. Depth $3\frac{3}{4}$, head $4\frac{2}{5}$. Eye in the middle of the length of the head. Lips fringed. Nine blackish cross-bands the first across the interorbital space, the second on the nape of the neck, the third and fourth in front of the dorsal, the sixth and seventh between the dorsal and the adipose fins, the eighth and ninth between the adipose and caudal fin. Fish from Para, River Capin, Brazil" (5, p. 308).

Thus, the points of difference from typical *L. fasciatus* are: fewer cross-bands, 9 instead of 11, and the position of the eye in the middle of the head. But the number of cross-bands varies partly with age, partly with locality, and many intermediate forms can be found. Another confusing fact is that sometimes one band is partly divided in two in the upper or lower portion, and counting the bands becomes uncertain.

The position of the eye seemed to be of more importance, but closer examination of many specimens of this form, which by the way come mostly from the lower part of the Amazon River, convinced us that this character alone cannot serve to separate this variety from other specimens of *L. fasciatus* (Bloch). However, the examination of large series shows that the fish described as *L. affinis* by Günther can be maintained as a subspecies of *L. fasciatus*, characterized by a smaller number of less defined cross-bands, sometimes incomplete or even wanting; the more compressed body, shorter dorsal and caudal. These differences can be readily seen on Plate 6 (*L. fasciatus* typical) and Plate 7 (*L. fasciatus affinis* Günther). Comparative measurements of several specimens are given below.

	Size	Number of bands	Position of eye	Dorsal	Upper lobe of caudal
L. fasciatus					
No. 20443	60–83 mm.	9 + 3	in the middle	shorter than head	broken
20434	148 mm.	9 + 3	nearer snout	shorter	short, 4 in depth
20386	220 mm.	9 + 3	almost in middle	shorter	short, $3\frac{1}{2}$ in depth
L. affinis					
No. 20426	140 mm.	9 + 2 double on belly	middle	equal	long $3\frac{1}{4}$ in body (longer)
1197	145 mm.	9 + 2 double on belly	middle	equal	long $3\frac{1}{3}$ in body (long)

Specimens of *L. fasciatus affinis* were collected at Gurupa, Pernambuco, Porto do Moz, Santarem, Tajapura (largest specimens about 206 mm. long), Rio Tapajos, Rio Xingu, Cotinho, Garupa.

7b. Leporinus fasciatus altipinnis, subsp. nov.

Plate 8

D. 12; A. 10; V. 10; P. 16; L. 1. 41–42; transv. 1. $\frac{6}{5}$; teeth $\frac{5}{5}$.

The unique specimen of *altipinnis* represents the extreme characters of the subspecies *affinis* Günther. It has a still higher dorsal and longer caudal, which are also more sharply pointed. Two specimens, 95 and 80 mm. long, from Jaturana, Brazil. The drawing is made probably from the specimen 80 mm. long. Form of body similar to *L. fasciatus* (Bloch), but somewhat more slender. Depth 4, head 4; eye large, less than 3 in head; it is situated a little nearer to the snout than to the opercle. Dorsal and caudal are well pointed. Anterior rays of dorsal a little longer than head's length; upper lobe of caudal $3\frac{1}{3}$ in the body depth. Lower jaw not projecting; teeth $\frac{6}{8}$.

Eight dark cross-bands completely encircling the body, including one on the neck; some of them dividing in two branches on the belly; 2 more on head, very distinct on the interorbital space and less distinct on the snout. The base of adipose is black (not shown in the drawing).

7c. Leporinus fasciatus tigrinus, subsp. nov.

D. 12; A. 10; V. 10; P. 17; L. 1. 39–40; transv. $\frac{6}{5}$; teeth $\frac{6}{8}$.

This variety of *L. fasciatus* is represented in the collections of the M. C. Z. by specimens No. 20,446 and 20,446a, 145 mm. long (both of equal size), from Goyaz, Brazil. The characters of this variety are: body more robust, less compressed and somewhat rounded; depth $3\frac{3}{4}$; head $4\frac{1}{3}$; eye $3\frac{3}{4}$; snout $2\frac{1}{4}$. Eye situated nearer to the snout than to opercle. Eight cross-bands on the body (including that on the neck); four of them in the middle of the body, divided on the back into two branch bands, resulting in a more striped appearance of the back. Two less conspicuous markings on the head.

Scales less numerous than with other varieties. Teeth on the lower jaw, two in front thin, long, sharp and produced, three others on each side are shorter; on the upper jaw six (not eight, as with all other varieties) incisors.

This subspecies seems to be a most marked one, and might almost be considered a distinct species. However, we prefer not to multiply the number of new species without necessity, and rank it as a subspecies of *L. fasciatus* (Bloch).

8. Leporinus mulleri Steindachner

Steindachner Fr., 1876, Sitz. Ber. Wien. Akad., **74**, Abth. I, Ichthyologische Beit. V, p. 105, pl. 9, fig. 5.

D. 12; A. 10; V. I, 8; L. l. 35; transv. $\frac{5}{6}$; teeth $\frac{6}{8}$ (Plate 12).

Body much compressed, depth 4; head 4; eye $3\frac{1}{3}$–$3\frac{1}{2}$; snout $2\frac{3}{3}$–$2\frac{3}{4}$. Fins shortish, with exception of dorsal which is high; its longest ray is almost as long as the head; it is set much nearer to the snout than the ventral fin and is well rounded. Anal does not reach even half way to the origin of caudal rays. Pectoral reaches only half way to ventral.

Scales rather large. Incisors of the upper jaw with cusps; on lower jaw, teeth are sharp and curved. There are 12–14 narrow dark bars on the head and the back; three faint black blotches along the anterior portion of the lateral line and a continuous longitudinal narrow stripe along the posterior portion of the lateral line and the caudal to the end of its middle rays.

A narrow silvery band along the lateral line could be traced on each specimen examined by us.

This species is represented in the M. C. Z. collections by: No. 19,479, two specimens 80 mm. long (both of the same size) from Teffé. The drawing is made from one of these specimens. No. 19,409, four specimens, 41, 38, 31 and 30 mm. long, from Jutahy. No. 19,608, one specimen, 43 mm. long, from Hyavary.

Their form and coloration make all these specimens very typical, and they well correspond to the description by Steindachner, and the drawing accompanying that description. His specimens were also of small size, not larger than 90 mm.

This is the smallest of all the species belonging to the genus Leporinus. It is near to *L. nigrotaeniatus* Schomb., but differs from it by short anal fin and different coloration.

Another small leporin (size 85–100) described by Steindachner in the paper cited above, under the name *L. agassizii*, resembles *L. mülleri*, but can be distinguished by higher body, longer head and somewhat different coloration (see fig. 4 and 5 of Plate 12, accompanying this paper).

9. Leporinus jamesi Garman, sp. nov.

Plate 9

D. 12; A. 10; V. 9; L. l. 45; transv. l. $\frac{5}{5}$; teeth $\frac{8}{8}$.

Body compressed, head pointed, outlines subfusiform; head $4\frac{1}{4}$ and depth $3\frac{3}{4}$ times in the length to the fans of the caudal rays. Eye large $3\frac{2}{3}$ times in head, $1\frac{1}{3}$ times in snout. First ray of dorsal about midway from snout to base of caudal.

Origin of dorsal midway from snout to adipose. Upper and lower outlines nearly equal in curvature. The shape of the dorsal is somewhat like that of the $3\frac{1}{4}$ inch example of *L. fasciatus* shown on Plate 6, in the amount and convexity of its margins, but does not differ so much in the length of anterior and posterior rays as is shown in Plate 8. On the anal fin, however, the hinder rays of the Manacapuru specimen are very short while the anterior are long, giving a shape more like that of the same fin on Plate 8 (*fasciatus*) where the hind rays of the dorsal are shorter and the anterior taller.

One of most marked differences between the present species and *L. fasciatus* is found in the teeth: whereas the incisors of *L. fasciatus* have a median angle in the cusp, those of *jamesi* have a median notch, that is, the cutting edge of the incisors is divided by a median notch, at each side of which is a prominence. The lateral teeth of the upper and all the lower have cusps like those of *L. fasciatus*.

With regard to the coloration, while the transverse blotches are nearly the same in number 10–11, they do not extend below the lateral line. Even on the back they are faint and narrow. On the fins there are markings such as have been noticed on other species. On the dorsal the proximal half, or basal half, has a blotch that fades backward, and on the central rays near their tips there is another transverse blotch. On the pectoral three transverse blotches appear in the proximal half; and there are two similar bands on the anal fin toward the bases of the rays. The markings and the dentition serve to distinguish this form from the other fasciated species.

It was collected at Manacapuru by Dr. James.

10. Leporinus pachyurus Cuvier & Valenciennes

Plate 14

Leporinus pachyurus Cuvier & Valenciennes, 1849, Hist. nat. des Poissons, **22**, p. 36.
Leporinus brachyurus Castelnau, 1855, Anim. Amer. Sud, Poissons, p. 59, pl. 30, fig. 1.
Leporinus pachyurus Günther, 1864, Catalogue, **5**, p. 308.
Leporinus leschenaulti Cuvier & Valenciennes, loc. cit., p. 30, pl. 635, juv.
Leporinus leschenaulti Günther, Catalogue, **5**, p. 307.

D. 12; A. 11; V. 10; L. l. 40; l. transv. $\frac{6}{7}$; teeth $\frac{6-8}{8}$.

Body short, depth $3\frac{1}{2}$; head short $3\frac{2}{3}$ and broad in the front; eye 3; snout 3. Teeth strong, entirely truncated on the upper jaw; two on the lower, long, thick, and very much produced, particularly in the young. The pectoral terminates half way or farther to ventral; both as well as anal, are short. Tail short, caudal is remarkable for the thickness of its rays.

Coloration of adults uniform, while the young, from one of which the accom-

panying drawing is made, have usually three large spots or blotches on the lateral line and several faint cross-bars on the back.

There were 5 bottles in the M. C. Z. labelled *Leporinus leschenaulti* Cuvier and Valenciennes. A close examination of their contents and comparison with *L. fridcrici* (Bloch) and the description of the three allied forms (*fridcrici, pachyurus* and *leschenaulti*) showed that the medium-sized specimens, 110–127 mm. long, with faint spots are undoubtedly *L. pachyurus* Cuvier and Valenciennes, while the specimens 55–105 mm. long, with well-defined round black spots are young of the same species. Thus *L. leschenaulti* Cuvier and Valenciennes and *L. leschenaulti* Gunther are synonyms of *L. pachyurus* Cuvier and Valenciennes, being young specimens of the same species. In this particular case, as with *L. fridcrici*, the young differ greatly from the adults not only in coloration, but also in the sharper and longer teeth (not worn down), larger eyes and some other minor characters. These differences probably induced Cuvier and Valenciennes to describe a new species *L. leschenaulti*, this description and the accompanying figure correspond perfectly well with the smaller specimens of the M. C. Z. collection labeled as *L. leschenaultii*, namely No. 19,611, two specimens, 55 mm. from Javary, Brazil, Thayer Expedition, and No. 20,449, one specimen, 105 mm., from Brazil, Hassler Expedition.

Three others also labeled *L. leschenaultii*, No. 20,396, one specimen, 90 mm., from Gurupa, Thayer Expedition No. 20,392, one specimen, 110 mm. from Lake Hyanuary, Thayer Expedition and No. 20,496, 127 mm. from Lake Araray, Thayer Expedition, are spotless or with very faint blotches. All of them are *L. pachyurus* and they much resemble *L. fridcrici* of the same size, which probably induced Steindachner and Eigenmann to consider *L. leschenaulti* a synonym of *L. fridcrici* (see Sitz. Ber. Wien. Akad. Sci., 71, 1875, p. 223 and Mem. Carn. Mus. v. V. 1912, p. 303).

In order to verify this theory I made parallel sketches of the body outlines of both species and their comparative measurements. The results of the comparison are as follows: specimens No. 20,449 *L. leschenaulti* (=*L. pachyurus*) and No. 20,436 *L. fridcrici* of about the same size (105 and 110 mm.) differ at a glance in the depth of body and head length; *L. leschenaulti* (=*L. pachyurus*) has the body less deep, the belly outline very slightly convex and a longer head with pointed snout, while *L. fridcrici* has a deep body, strongly convex between head and dorsal, a fairly convex belly outline, and a short head with obtuse snout.

Specimens No. 19,611, *L. leschenaulti* (=*L. pachyurus*), 55 mm. long and specimen No. 19,358, *L. fridcrici* 65 mm. long, differs in exactly the same respects

TABLE II

	Dorsal	Anal	Ventral	Lat. line	Transv. l.	Head	Depth	Eye	Snout	Teeth	Coloration	Remarks (size or age)
L. pachyurus C. V.	11	9	9	40	—	4	$3\frac{1}{2}$	—	—	Strong, upper truncate, 2 lower pointed	Uniform, no spots	Crown very wide, specimen 14–17 inches
" Gnthr.	12	11	10	40	$\frac{6}{7}$	4	$3\frac{1}{3}$	—	—	Broad and truncated	Uniform	Eye nearer to the end of opercle than the extremity of snout. Pectorals terminate far from ventral
L. leschenaulti C. V.	12	11	9	36	$\frac{6}{7}$	4	$3\frac{1}{2}$	—	—	Small, truncate	Two large round spots	Small specimen, young
L. leschenaulti Gnthr.	12–13	11–12	—	37–39	$\frac{5-6}{6}$	$3\frac{1}{2}$	$3\frac{2}{3}$	—	—		Three large round spots	Spec. ?
L. friderici (Bloch)	12	11	9	38–39	$\frac{5}{6}$	4	?	—	—	Brown with the edge produced into point	Three spots	Eye situated in the middle. Pectoral far from ventrals

TABLE III

L. leschenaulti C. V. (= *L. pachyurus* C. V.) of medium size, 116 mm. No. 20,449	11	11	9	39	$\frac{5}{6}$	$3\frac{5}{8}$	$3\frac{1}{2}$	$5\frac{1}{4}$	$2\frac{3}{4}$	$\frac{8}{6}$ Upper truncate and with cusps, lower moderately produced, brown edged	Two faint spots	Eye situated in the middle
L. friderici (Bloch) No. 20,427, 116 mm.	I, 11	1, 10	10	37	$\frac{5}{5}$	$3\frac{3}{4}$	$3\frac{1}{4}$	4	3	$\frac{8}{6}$ Upper truncate with cusps 2 lowers much produced, brown edged	Two faint spots	Eye situated nearer to the snout than to the end of opercle

as medium-sized specimens, and moreover *L. leschenaulti* has the lower teeth more produced, so that they are never included when the mouth is shut. This makes it easy to distinguish these two species in their younger stages. Comparative measurements of the same specimens, confirming the above statement, present further particulars which serve to separate them. They are presented below in Table I:

TABLE I

	Head	Depth	Eye	Snout	L. l.	Tr. l.	Teeth
L. friderici 110 mm.	4	$3\frac{1}{3}$	4	$3\frac{1}{2}$	36	$\frac{5}{6}$	$\frac{8}{6}$
L. pachyurus 105 mm.	$3\frac{2}{3}$	$3\frac{1}{4}$	3	3	38	$\frac{5}{5}$	$\frac{8}{6}$

Table II gives the characters of the three proposed species, *pachyurus*, *leschenaulti*, and *friderici*, as compiled from the original descriptions of their authors. It further emphasizes the fact that the differences between *L. pachyurus* and *L. leschenaulti* are matters of age, while *L. friderici* has definite characters, which cannot be ascribed to age. Table III gives the comparative measurements and characters of two medium-sized specimens of *L. pachyurus* and *L. friderici*, which can be contrasted with those of younger specimens in Table I.

Leporinus pachyurus is represented in the Museum collection by small and medium-sized specimens only.

The drawing, No. 14, herewith reproduced was evidently made from a young specimen and in Garman's list of plates and species it is referred to *L. leschenaulti* Cuvier and Valenciennes, which we consider to be a synonym with *L. pachyurus*, Cuvier and Valenciennes.

11. Leporinus conirostris Steindachner

Leporinus conirostris Steindachner Fr. 1875, Sitz. Ber. Wien. Akad., **72**, p. 253, Taf. 4.

D. 12; A. 10–11; V. 9; P. 16; L. l. 39,040; transv. l. 5–$5\frac{1}{2}$–$4\frac{1}{2}$–5 (Plate 5).

Body compressed, depth $3\frac{2}{5}$, back in young forms a rather high arch which decreases with age. Head $3\frac{1}{3}$, subconical, crown nearly straight longitudinally. Snout blunt, $2\frac{1}{3}$ in head, eye $4\frac{1}{2}$; mouth low; teeth $\frac{6}{6}$, short, upper incisors horizontally truncate, lower more obliquely truncate. In larger specimens than the one shown in the plate, both upper and lower incisors have a notch and a smaller cusp toward the median line, near the inner edge of the tooth. Lower jaw slightly shorter and included, when mouth is closed. Young specimens have about five

irregular faint cross-bands on the sides, which partly bifurcate, and one more pronounced spot on the base of the caudal than adults. Large specimens lose the transverse bands, but a dark marking at the base of caudal remains. There are also some differences in the relative dimensions of the body parts. The above description is based on the measurements of M. C. Z. No. 20,413, nine specimens from 79 mm. to 117 mm. long, from Mendez, Brazil. One of these specimens is drawn on Plate 5.

This species is represented in the collections of the M. C. Z. by many specimens from Parahyba, Rio Doce, Porto Alegre, Mendez and Gurupa. They reach a maximum size of 13 inches.

12. Leporinus margaritaceus Günther

Leporinus margaritaceus Günther, 1864, Catalogue of Fishes of Br. Mus., **5**, p. 309.

D. 12; A. 11; V. 10; L. 1. 39; transv. 1. $\frac{6}{6}$ (Plate **13**).

Head 5; depth 5; eye 4 in body; it is a little nearer to the end of the operculum than to the extremity of the snout. Lips rather thick, not fringed. Teeth rather narrow, the lower obliquely truncated. The distance of the first dorsal ray from the extremity of the snout equals that from the adipose fin. Anal rays long, reaching beyond the root of the caudal if laid backwards. Coloration uniform, each scale with a broad pearl-colored margin; an indistinct yellowish band along the side of body and tail, below the lateral line. Günther's type, $8\frac{1}{2}$ inches long, from British Guiana.

This species is not represented in the M. C. Z. collections at the present time, and the description above is taken from Günther. Our drawing was made at the same time as the drawings of all the other leporins, but probably the specimen was borrowed. We include it in this paper for comparison with another allied species, *L. pachyurus* Günther, and because Günther's description of this species was not accompanied by a drawing. It must be remarked, however, that there are some discrepancies between our drawing and Günther's description quoted above (l. c., p. 309), namely: number of scales in lateral line 36 (not 39); depth greater than the head's length, and contained only $3\frac{1}{4}$ in the body. Head $3\frac{3}{4}$ (not 5); the position of D. farther back from the snout. We conclude that this drawing is *L. margaritaceus* from Garman's ms. list of species in which the corresponding plates were indicated.

13. Leporinus hypselonotus Günther

Leporinus hypselonotus Günther, 1868, Proc. Zoöl. Soc. Lond., p. 244.
Abramites hypselonotus Fowler, 1906, Proc. Phila. Acad. Nat. Sci., p. 331.

D. 12; A. 13–14; V. 9; L. l. 38–41; transv. l. $\frac{6}{6}$; teeth $\frac{6}{6}$ (Plate 17).

Body and head compressed, short and deep. Upper outline concave at occiput, convex between head and dorsal, giving the impression of a humpback; lower outline convex from throat to caudal with a protrusion between the head and ventrals. Peduncle short and high.

Head small, about $4\frac{1}{3}$ in body; depth $2\frac{1}{2}$; eye small, 4 in head; snout blunted, 3 in head. Lower jaw the longer. Crown much arched transversely. Mouth small, narrow, oblique anteriorly. Teeth on the upper jaw broad, bluntly pointed; on the lower sharply pointed and supplied with a notch toward the outer edge (see fig. 4). The anterior teeth are rather abruptly bent backward in the middle of their height. Gill-membranes feebly attached to the isthmus.

Dorsal fin high, the longest rays longer than head's length. Base of anal longer than that of dorsal, with more rays than dorsal (13–14). Pectoral long, reaching beyond the base of ventral. Caudal short, not too deeply forked.

Coloration: on the silvery white ground color there are 8 broad transverse bands of brown, 3 of them in front of the dorsal, one through the dorsal and the ventral, 2 between ventral and anal, and 2 on the peduncle. Dorsal and ventral with dark bars, base and tip of adipose black, the middle thereof white. The lower lip is commonly black (not shown in the drawing).

This species differs in many characters from all other species of the *genus Leporinus*, and Fowler proposed for it a new genus, *Abramites* (l. c.). The only generic character indicated by the author is the "larger anal basis." There are two more important characters: (1) the gill-membranes, which with all other leporins are strongly and completely attached to the isthmus, are only feebly attached in *L. hypselonotus*; (2) very deep and slightly humpbacked body. Both of these characters show that this particular species is intermediate between *Leporinus* and the subfamily *Tetragonopterinae*, characterized by the absence of the said attachment of the gill membranes to the isthmus and the high and broad body. However, we prefer to consider *Abramites* Fowler as a subgenus only, because another species, *L. eques* Steindachner, is very close to *L. hypselonotus*, and there are some other groups for example *L. mormyrops* and *L. garmani*, which could constitute another subgenus *Hypomasticus*. When a complete revision of the genus is made by somebody in the future, it will surely be divided into several

subgenera, without altering the familiar generic name *Leporinus* Spix for all the described species.

This species is represented in the collections of the M. C. Z. by nine specimens, from 62 to 71 mm. long, collected at Manacapuru, Brazil (No. 21,436). They are all alike, very typical and perfectly drawn on Plate 17. The only thing to be added is a very distinct black spot on the lower lip.

Günther's specimen was 150 mm. long from Xeberos (upper Amazon River). There is only one slight difference in his description with ours, head $4\frac{1}{2}$ in body. 10 rays in dorsal and 7 cross-bands. *Leporinus eques* Steindachner (Denkschr. Acad. Wien. 1878, 39, p. 40, taf. 10, fig. 2) from Rio Magdalena, is the nearest species to *L. hypselonotus* Günther, but it differs in the less deep body (3 and not $2\frac{1}{2}$ in length), smaller scales (41–42 in 1.1) and more numerous rays (15) in the anal fin.

Leporinus salarii Holmberg 1891, Rev. Arg. Hist. Nat. I, p. 187, 64 mm. long, from Argentina is surely a synonym of *L. hypselonotus* because the description supplies nothing by which to distinguish the species from *L. hypselonotus*.

14. Leporinus cylindriformis sp. nov.

Specific characters: — Body elongate, slender, upper and lower contours of body's outlines almost equal; anal long, reaching beyond the base of caudal, truncate; caudal with short, well-rounded lobes. Scales small.

D. 12; A. 10; V. 9; L. 1. 44; transv. 1. $\frac{6}{7}$; teeth $\frac{8}{8}$.

Description of a single specimen M. C. Z. No. 20,430, 205 mm. long, collected at Porto do Moz, Brazil, by L. Agassiz, Thayer Expedition (Plate 10).

Head $4\frac{1}{2}$; depth $4\frac{3}{4}$; eye 4; snout $2\frac{1}{2}$.

This is the slenderest species of the genus, body being nearly round (see fig. 3). Its outlines are graceful, a very low curve from end of snout to dorsal fin. Snout moderate, slightly blunted. Head subconical, its length little more than depth of body. Mouth anterior, lips with small papillae. Teeth on the upper jaw bluntly rounded, on the lower pointed and curved. Fins of moderate size, except dorsal which is rather high; anal long reaching, when stretched out, beyond the base of caudal, its end slightly concave; caudal moderately forked, its lobes well rounded and widely spreading; ventrals and pectorals short, rounded.

Scales small; each scale partly silvery white and partly dusky, their longitudinal rows forming interrupted lines (see fig. 1, Plate 10). On the drawing they are shown only above the lateral line, but actually they are also present below the lateral line. There are three oval dusky blotches on the lateral line.

The single specimen in the collection of the Museum of Comparative Zoölogy seems to be very typical, and differs from its nearest ally *L. nigrotaeniatus* Cuvier and Valenciennes, by the absence of a very distinct and constant continuous black longitudinal stripe along the whole posterior half of the lateral line to the base of caudal, and some other minor characters.

15. Leporinus bahiensis Steindachner

Leporinus bahiensis Steindachner, 1875, Sitz. Ber. Wien. Akad., **71**, p. 231, Taf. 2, fig. 2.

D. 13 (12); A. 11; V. 9; L. l. 32–36; transv. 1.$\frac{1}{3}$; teeth $\frac{6}{8}$ (Plate 16).

Body robust, moderately compressed, back high, depth 2$\frac{3}{4}$–3; head short and low 3$\frac{1}{2}$–4. Forehead with a low transverse arch nearly straight longitudinally. Snout blunt. Eye moderate, 3 in head; lower jaw the longer. Teeth six on the upper and eight on the lower jaw; they are pointed and two middle ones on the lower jaw much produced; the hindmost teeth on the lower jaw very small, reduced to a spine.[1] Scales large. There are three large black formless blotches on the sides on and below the lateral line in its posterior portion, and several oblique cross-bands on the back in young specimens.

This species, especially when young, bears a strong external resemblance to *L. friderici* (Bloch), but the squamation and coloration are different; the scales are visibly larger, the peduncle longer, the head not so thick and short. Formless large black blotches instead of one round spot and their different situation serve also to separate it from *L. friderici* (Bloch) and *L. copelandi* Steindachner.

Steindachner's original description and drawing were based on ten specimens, all of which were evidently young, sizes 45–90 mm. The M. C. Z. collection consists of the following specimens:

No. 20,478, three specimens, 170–160 mm. from Rio Puty, Thayer Exped.
20,493, four specimens, 65–66 mm. from Bahia.
2,417, three specimens, 225 mm. from Rio Una.
1,191, three specimens, 138–155 mm. from Bahia.

[1] Plate 16, fig. 4 shows eight teeth on both jaws, but this is exceptional. We examined teeth of four specimens of No. 20,493, three specimens of No. 1,191 and three specimens of No. 2,417 — they all have only six teeth on the upper jaw and only one specimen of No. 20,478 was found having eight teeth on both jaws. The number of teeth does not seem to be entirely constant.

BIBLIOGRAPHY

Agassiz, Louis, and Spix, J. S.
Selecta genera et species piscium quae in itinere per Braziliam collegit J. B. de Spix. 1829.

Bloch, M.
Naturgeschichte der ausländischen fische. Berlin, 1785–95.

Cuvier and Valenciennes
Histoire naturelle des poissons, 1849, **22**, pp. 23–40, planche 635.

Eigenmann, C. H.
Catalogue and bibliography of the freshwater fishes of the Americas south of the Tropic of Cancer. Contrib. from the Zoöl. Lab. Indiana Univ., no. 76, p. 2, 1910.
The fresh-water fishes of British Guiana. Mem. Carn. mus. 1912, **5**, pp. 299–309, 3 plates.
The fresh-water fishes of northwestern South America. Mem. Carn. mus., 1922, **9**, no. 1, pp. 117–120, 1 plate.
The American Characidae. Mem. mus. comp. zoöl., 1917, **43**, pt. 1.

Fowler, H. W.
Further knowledge of some heterognathous fishes, pt. 1. Proc. of Acad. of Nat. Sci. Philadelphia, 1906, **58**, pp. 293–351.

Günther, S.
New species of fish from Essequibo. Ann. and mag. nat. hist., 1863, **12**, p. 443.
Catalogue of the fishes in the British Museum, **5**, p. 306.

Holmberg, Ed.
Sobre algunos peces nuevos o poco conocidos de la Rep. Argentina. Rev. Arg. hist. nat. 1891, **1**, p. 187.

Müller, J. and Troschel, F.
Horae ichthyologicae, pts. 1 and 2, pp. 10–11, plate 1, fig. 7.

Norman, J. R.
Description of nine new freshwater fishes from French Guiana and Brazil. Ann. and mag. nat. hist., ser. 9, 1918, **18**, pp. 91–95.

Regan, T.
The classification of the teleostean fishes of the order Ostariophysi 1. Cyprinoidea (Characiniformes included). Ann. and mag. nat. hist., ser. 8, 1911, **8**, pp. 13–32.

Schomburgk, R. H.
The natural history of the fishes of Guiana, 1841.

Spix, J. B.
See Agassiz, L. 1829.

Steindachner, Fr.
Die Süsswasser-fische des südöstlichen Braziliens. Sitz. Acad. Wiss. Wien., 1875, **71**, pp. 216–245.
Ichthyologische beitrage, Sitz. Acad. Wiss. Wien., 1876, **119**, pp. 105–117, 1910 (pp. 265–272).
Ueber neue Characinerarten aus dem Orinoco und dem oberen Surinam.
Sitz. 1910, **119**, abth. II b, heft. I and II, pp. 268–270.

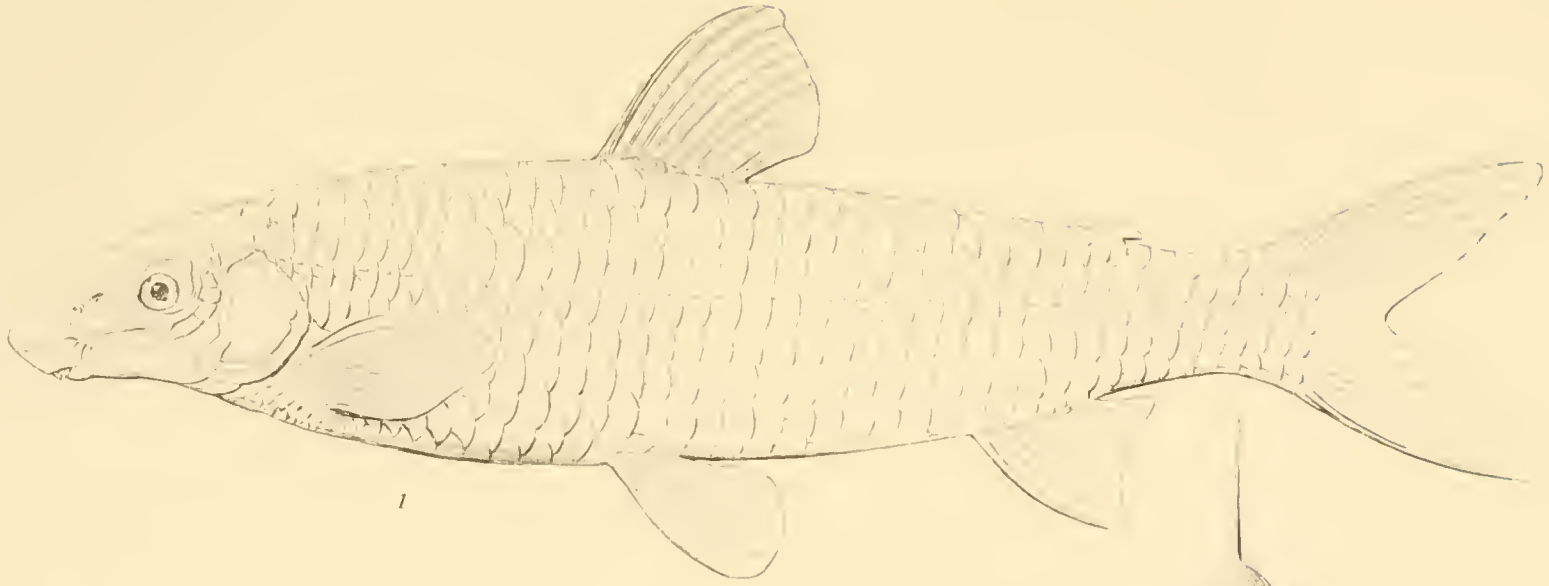
Valenciennes, A.
In D'Orbigny, Voyage dans L'Amérique Méridionale. Poissons, pl. 8, fig. 1.

EXPLANATION OF THE PLATES

EXPLANATION OF THE PLATES

Plate 1. Leporinus mormyrops Steind. Enlarged about $1\frac{1}{2}$.
" 2. " thayeri n. sp. Enlarged about $1\frac{1}{2}$.
" 3. " garmani n. sp. Natural size.
" 4. " crassilabris n. sp. Enlarged $1\frac{1}{2}$.
" 5. " conirostris Steind. Slightly enlarged.
" 6. " fasciatus (Bloch). Enlarged more than $1\frac{1}{2}$.
" 7. " fasciatus affinis Gnthr. Natural size.
" 8. " fasciatus altipinnis n. subsp. Enlarged $1\frac{1}{3}$.
" 9. " jamesi Garman n. sp. Probably natural size.
" 10. " cylindriformis n. sp. Enlarged $1\frac{1}{3}$.
" 11. " nattereri Steind. Slightly enlarged.
" 12. " mülleri Steind. Enlarged $1\frac{1}{2}$.
" 13. " margaritaceus Gnthr. ?
" 14. " pachyurus C. & V. Enlarged about $1\frac{1}{2}$.
" 15. " friderici (Bloch). $\frac{1}{2}$ natural size.
" 16. " Bahiensis Steind. Natural size.
" 17. " hypselonotus Gnthr. Enlarged $1\frac{1}{6}$.

On each plate: fig. 1 lateral view.
fig. 2 ventral aspect.
fig. 3 front view.
fig. 4 mouth, front view.
fig. 5 snout, lateral view.
On plate 12: fig. 6 head, lateral view.



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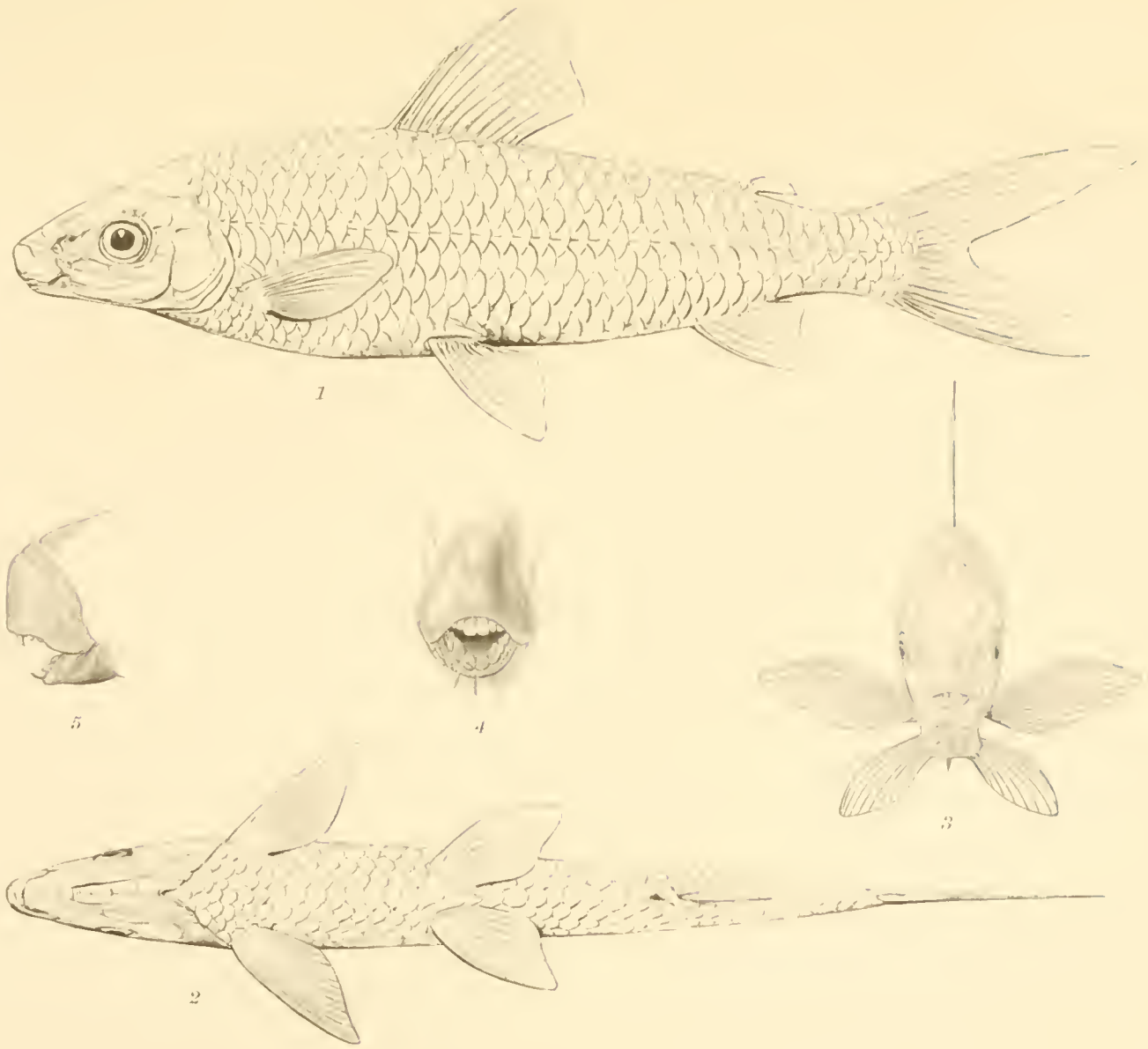
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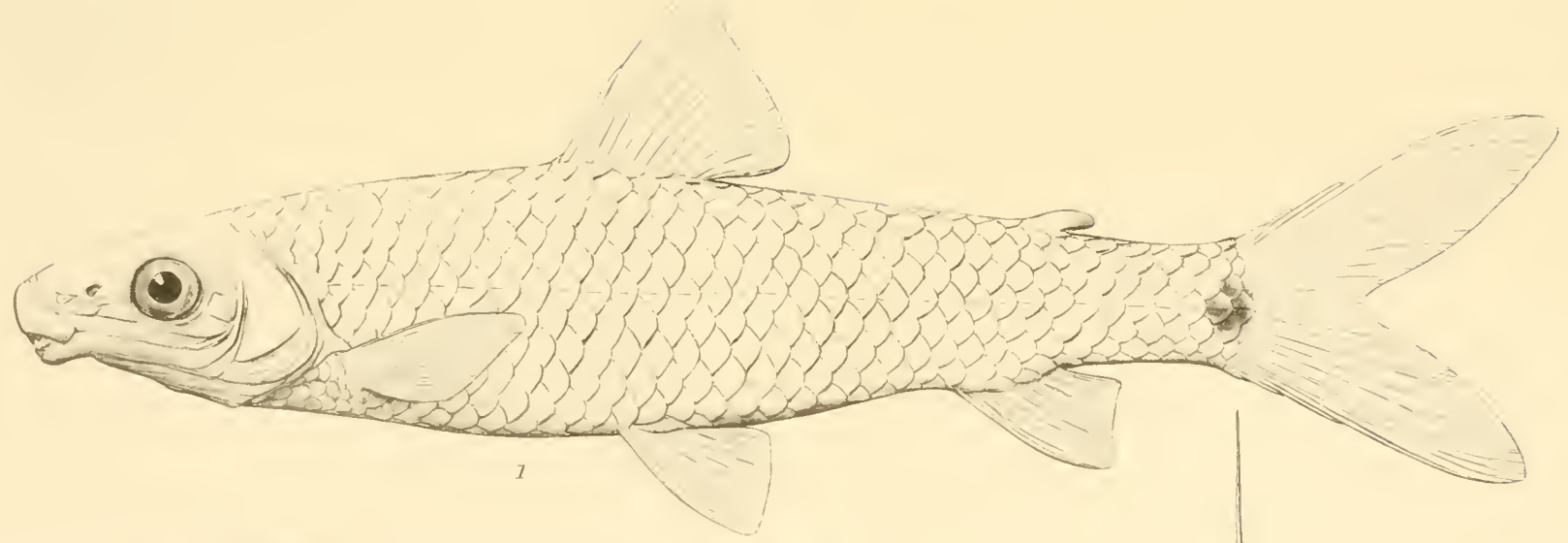

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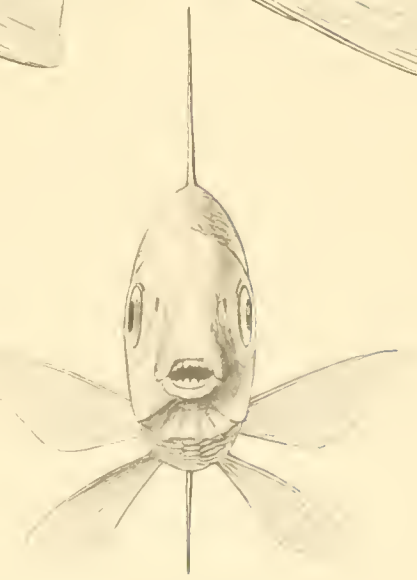

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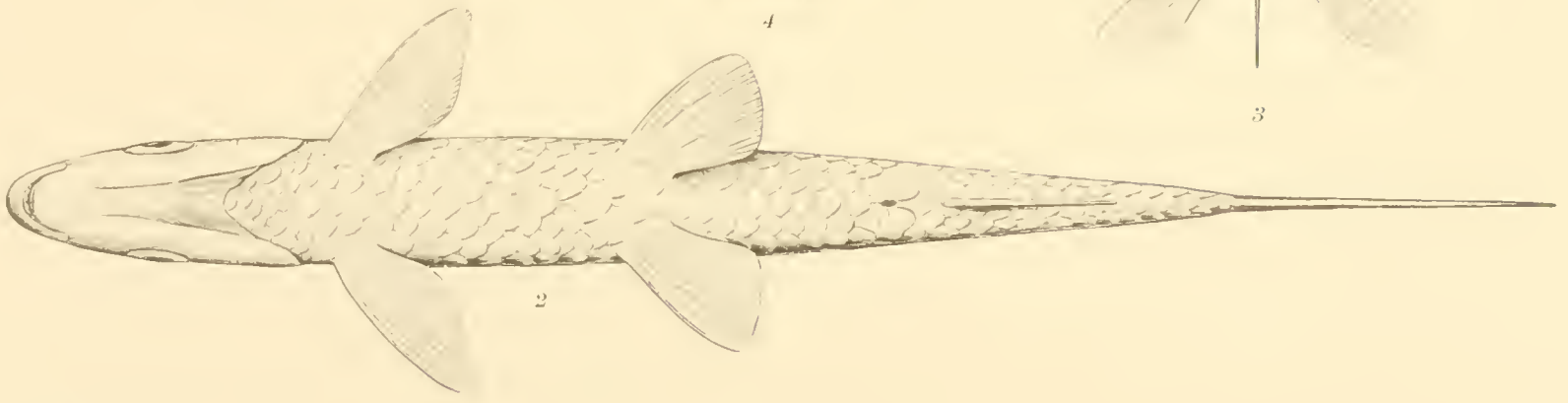

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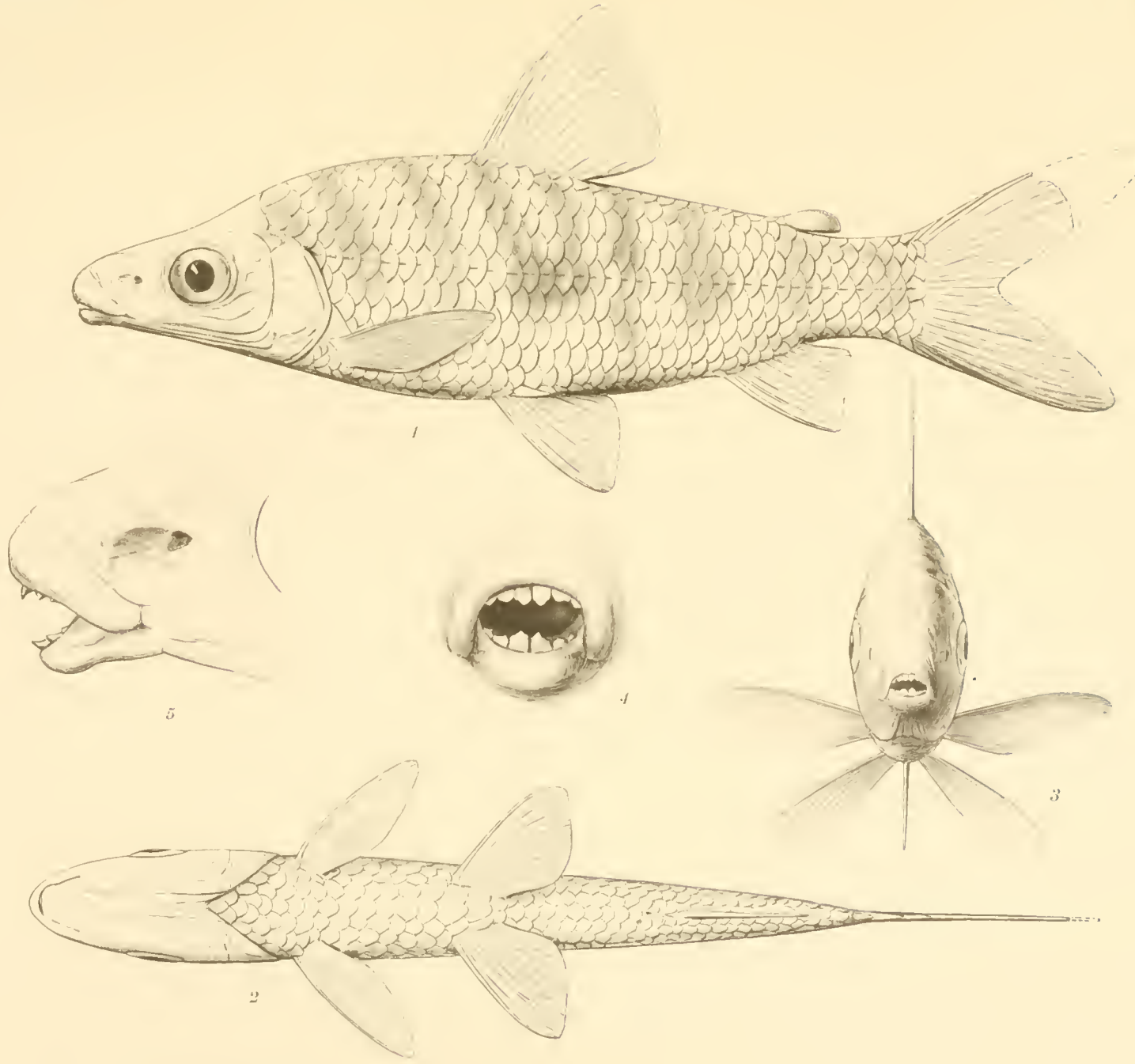
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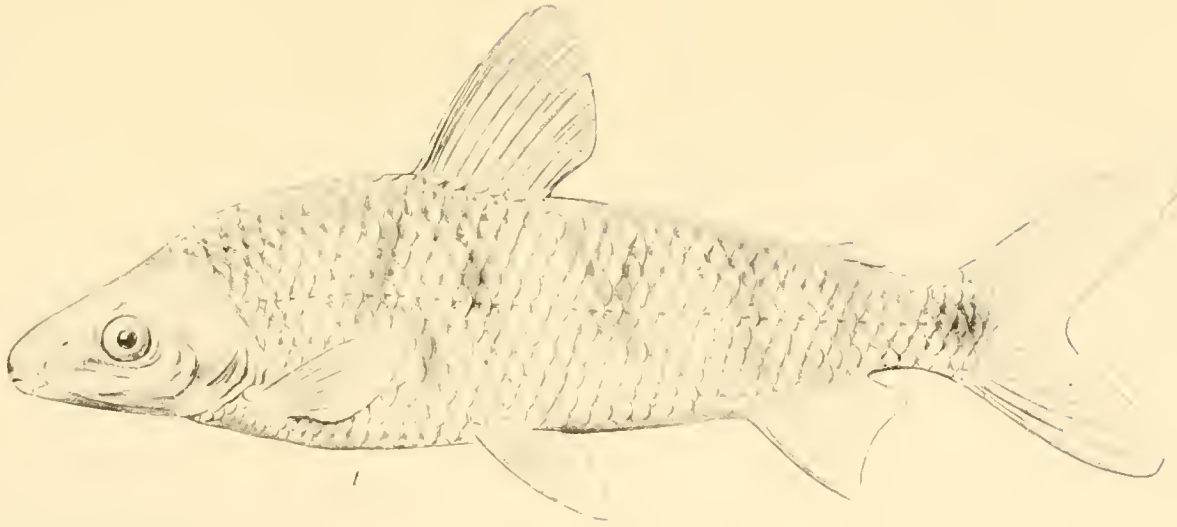

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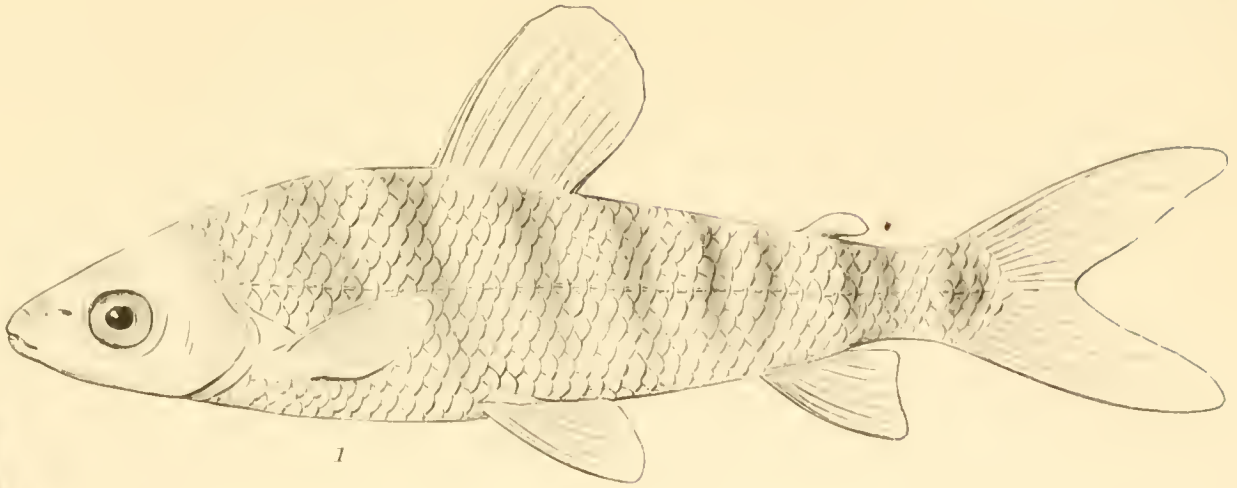

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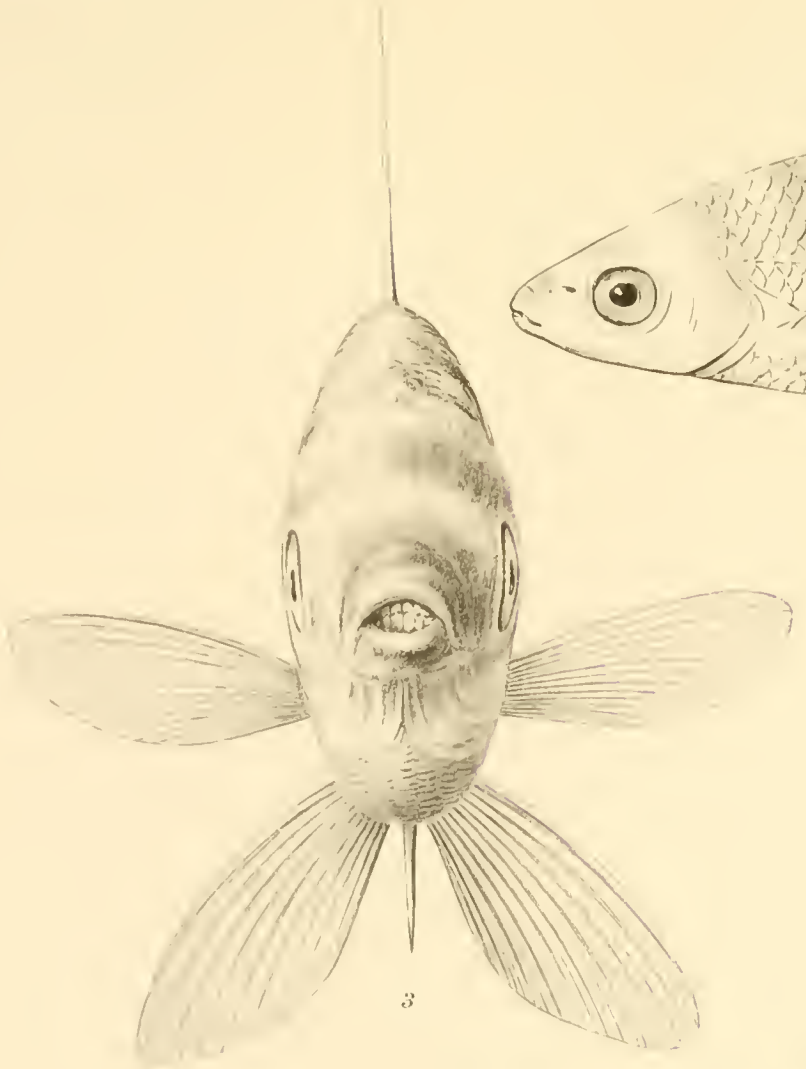

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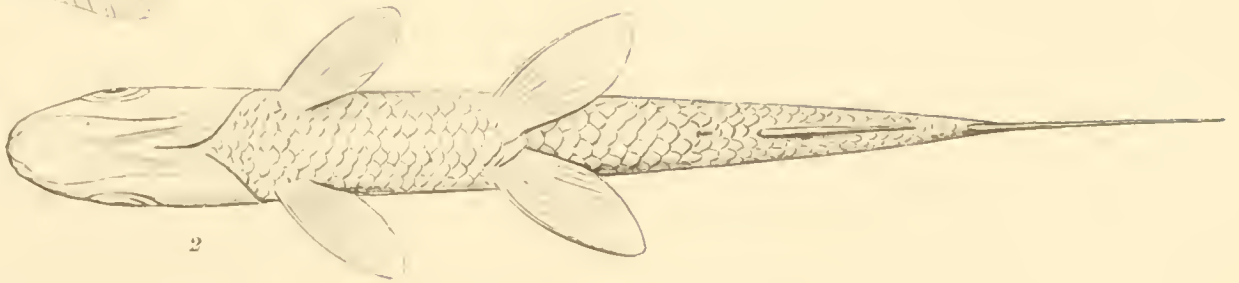

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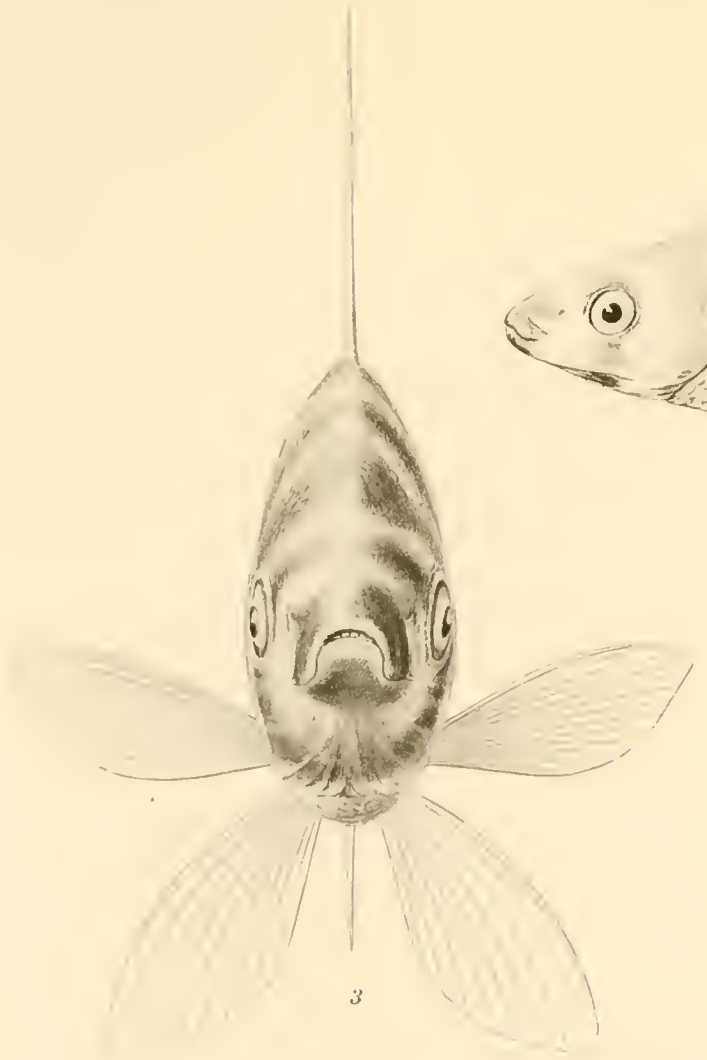

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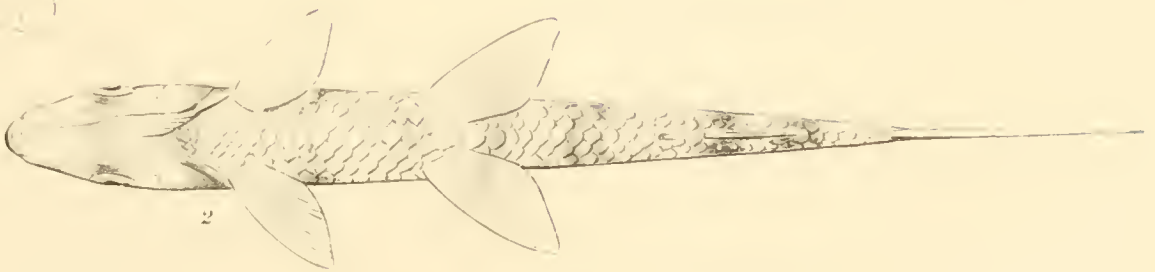

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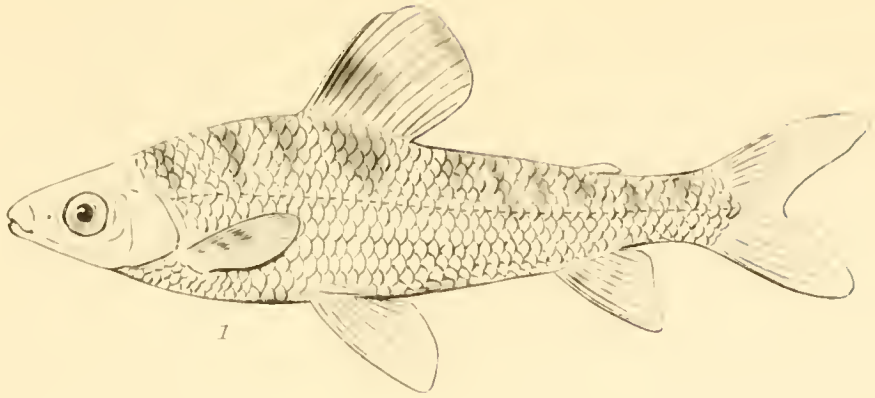

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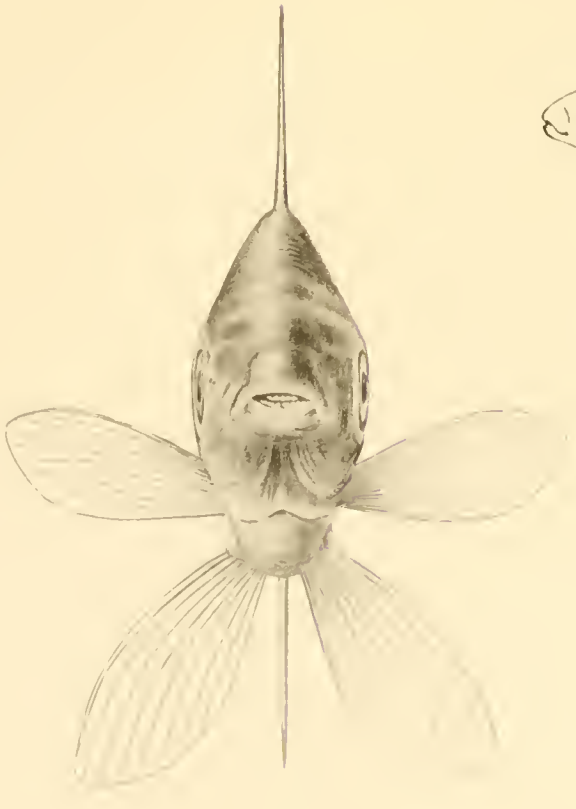

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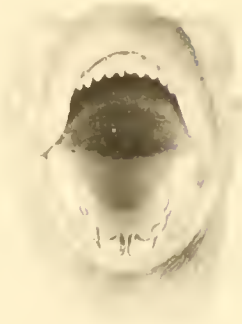

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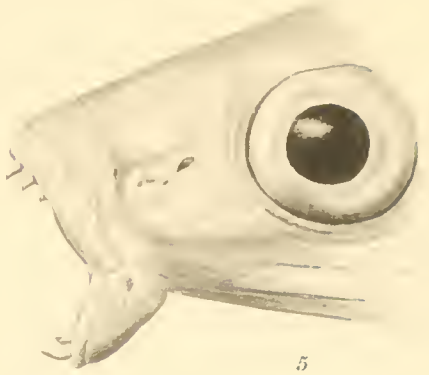

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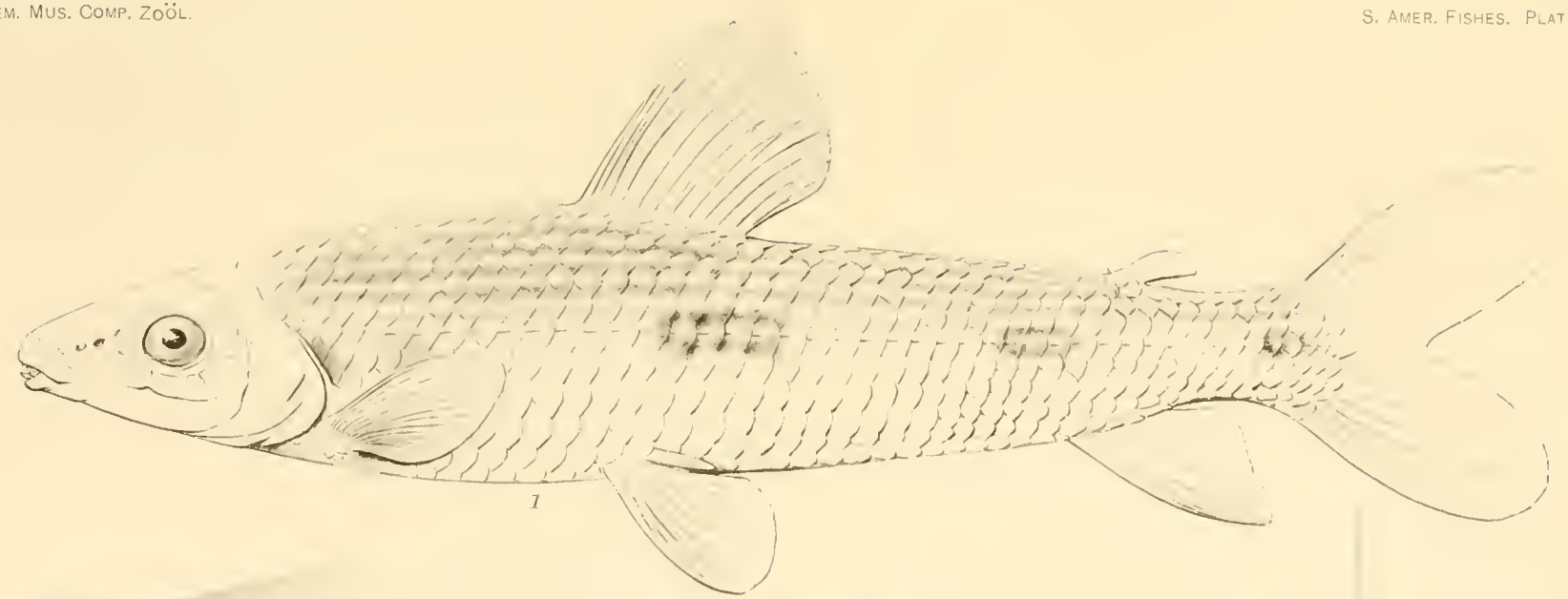

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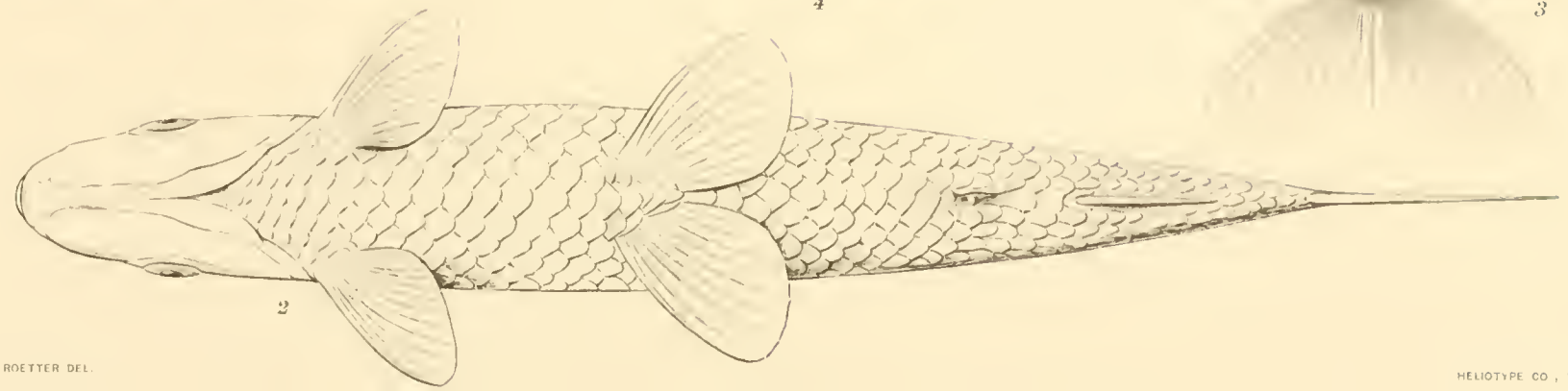

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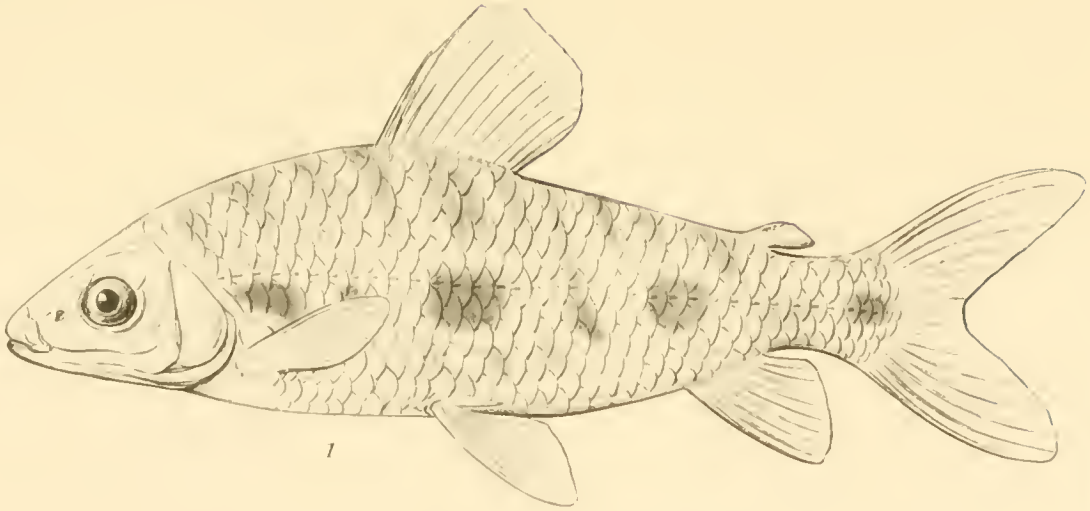

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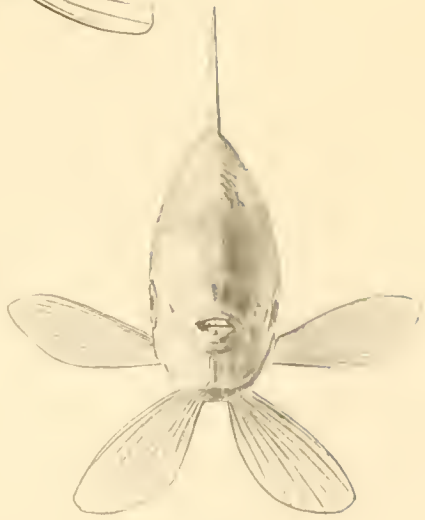

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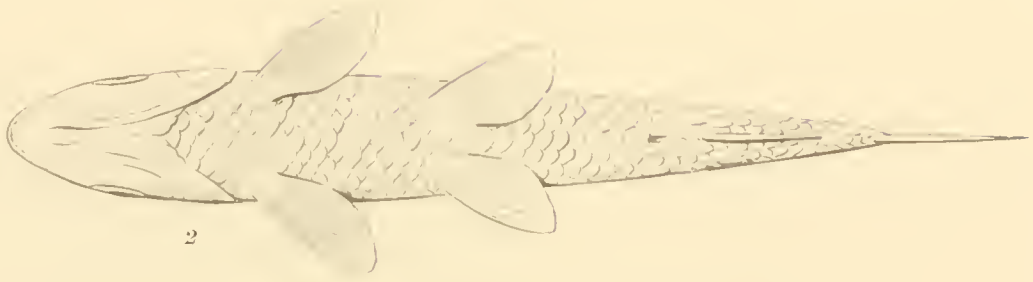

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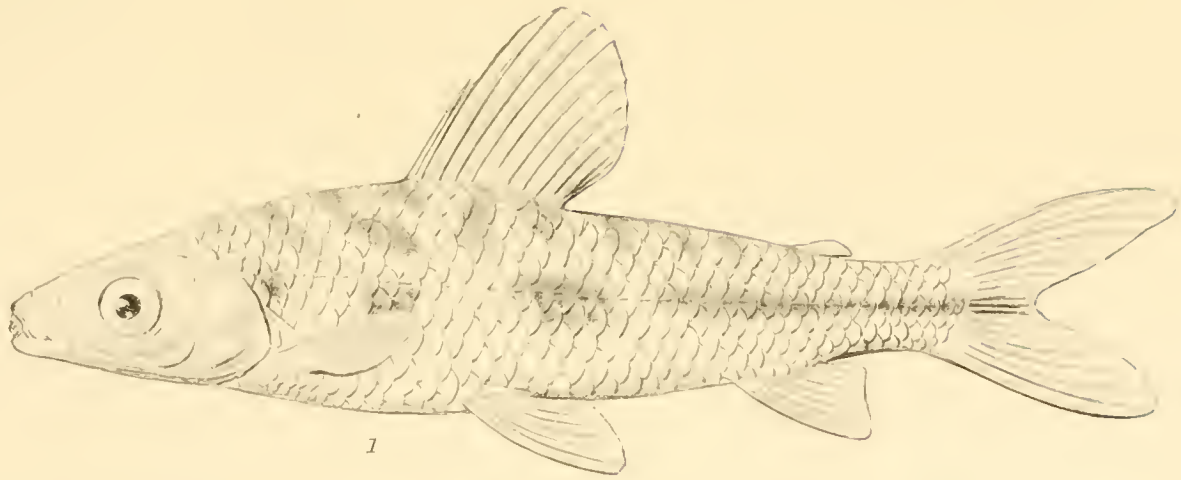

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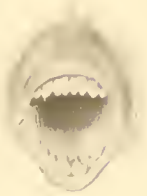

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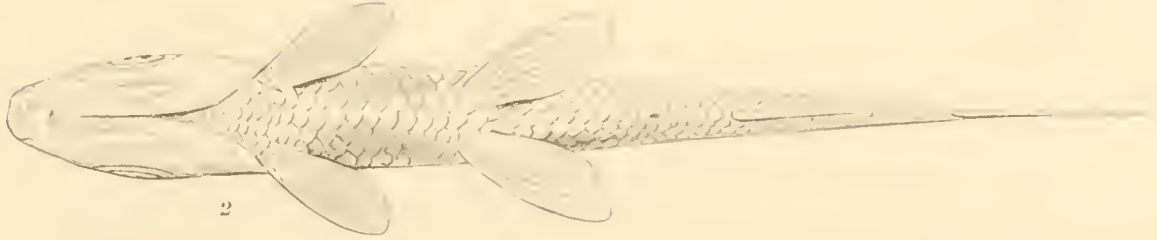

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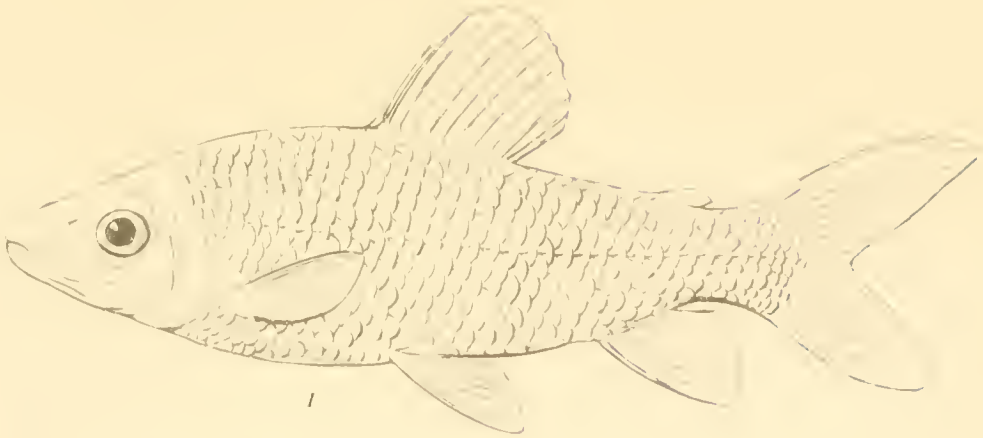

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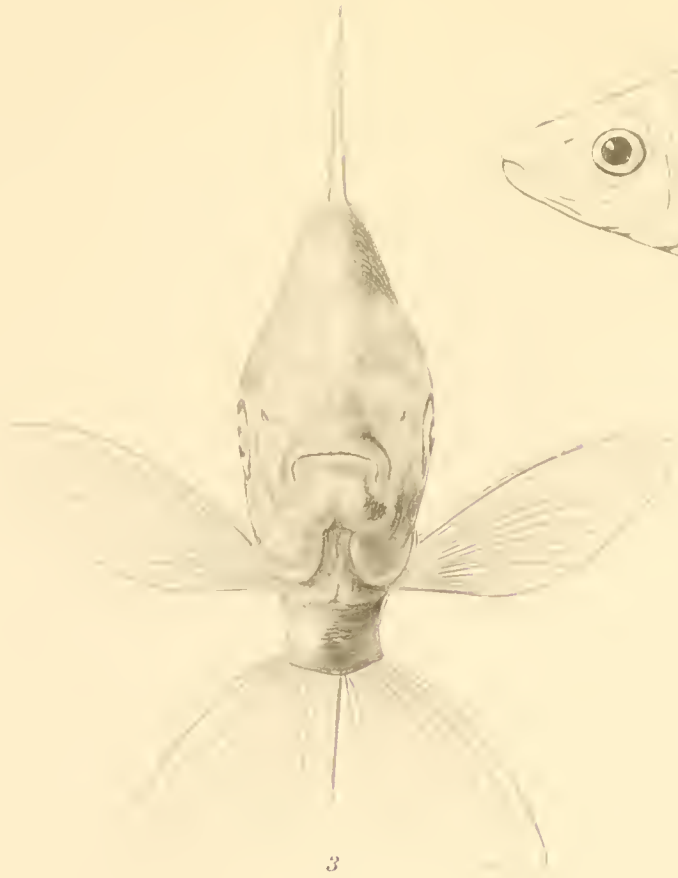

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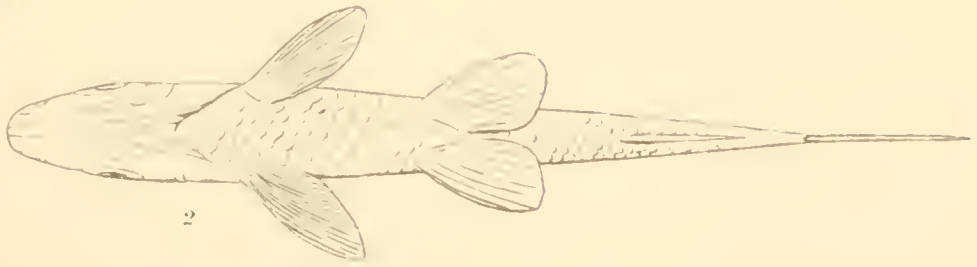

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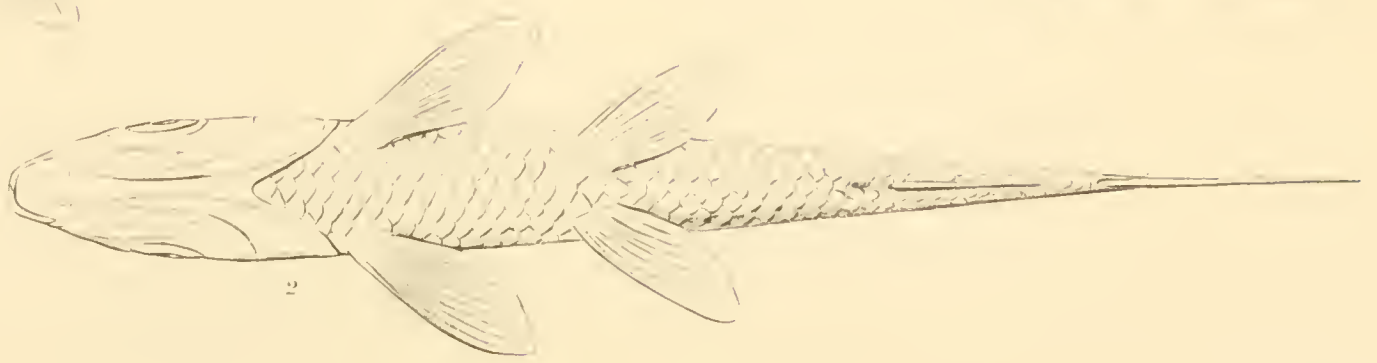

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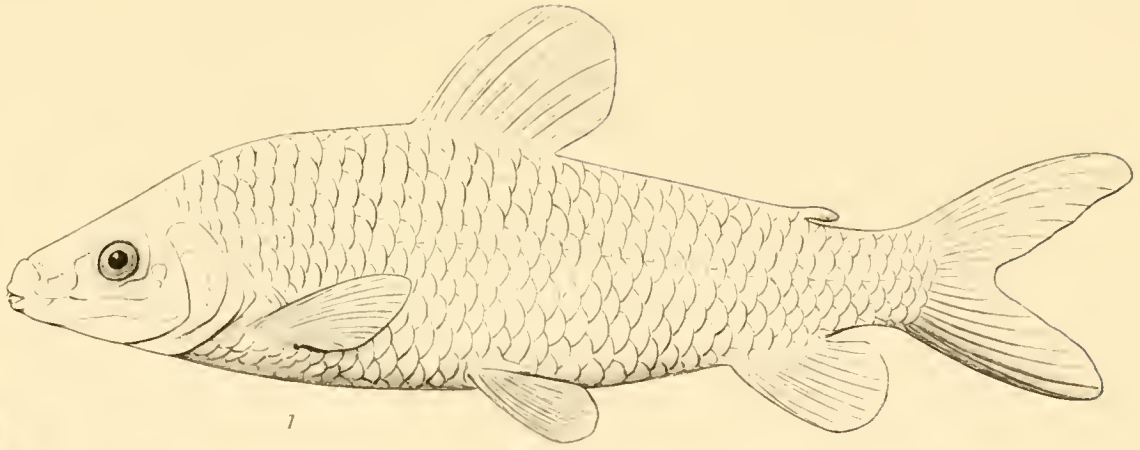

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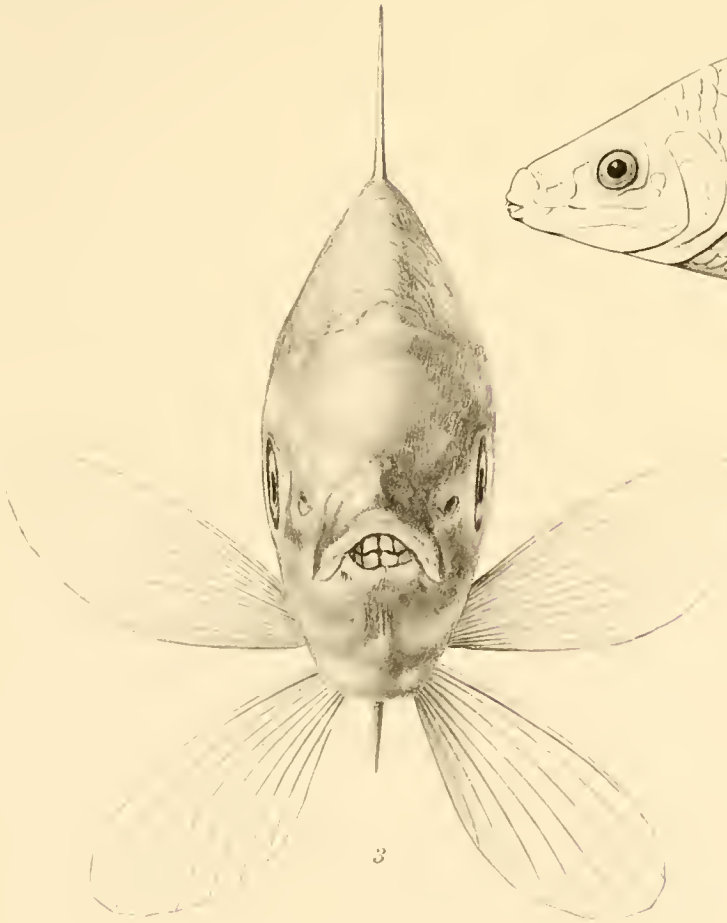

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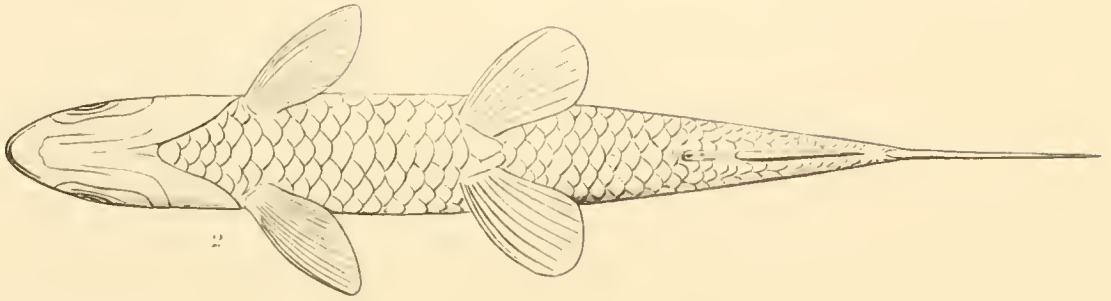

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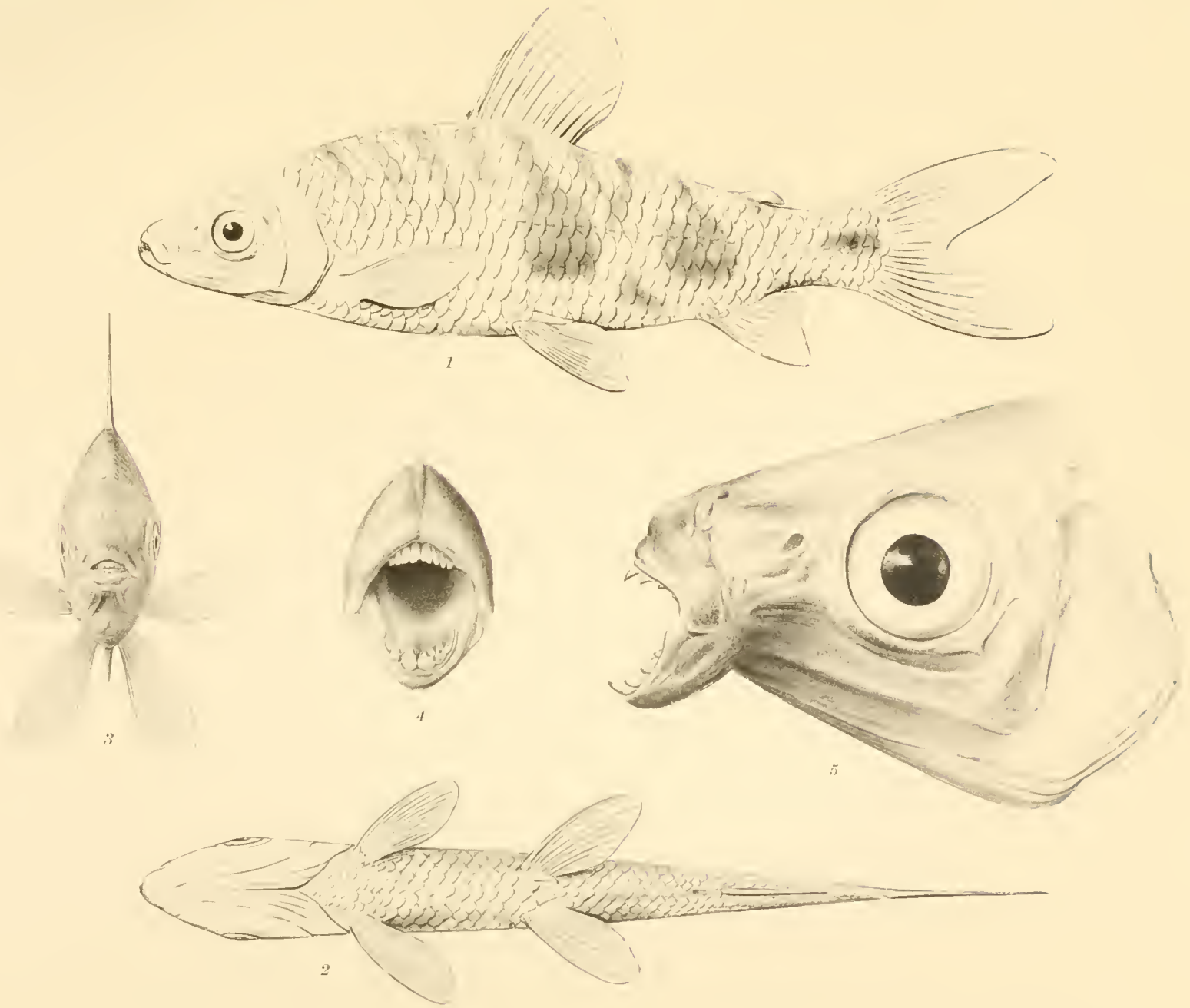
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